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January 11, 1996

Mr. Steve Eidt
Regional Water Quality Engineer
NYSDEC
615 Erie Blvd. West
Syracuse, New York 13204-2400

Dear Mr. Eidt:

With this letter I am transmitting the County Proposed Municipal Compliance Plan and Draft Environmental Impact Statement. These documents set out, in a manner consistent with the policy adopted by the Onondaga County Legislature on August 7, 1995, our proposed approach to upgrades of METRO and the CSOs. Our aim has been, and continues to be, attaining a balanced approach to the issue of wastewater treatment impacts to Onondaga Lake.

I call your attention to the attached transmittal letter from Commissioner Karanik. I share his concerns and wish to add and emphasize the fact that affordability and time of implementation of the proposed projects should be the primary focus of future discussions between the County and the State.

My staff and I stand ready to meet with the State and discuss what might be necessary to bring the proposed MCP to completion.

Sincerely,

Nicholas J Pirro

Nicholas J. Pirro
County Executive

cc: William E. Sanford, Chairman, County Legislature
Samuel H. Sage, President, Atlantic States Legal Foundation

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Executive Summary

- New York State proposes this solution to settle the lawsuit over Onondaga County's municipal compliance plan, bringing Metro sewage treatment plant and combined sewer overflows into compliance with State and federal environmental laws while also being affordable to the ratepayers of Onondaga County.

- The total plan, with the phosphorus removal pilot, will cost $380 million. Ammonia and phosphorus removal improvements to the plant will cost $235 million with an 8-10 year construction schedule. The plan also incorporates the CSO plan contained in the County's proposed MCP. This part of the plan will cost $144 million with a construction schedule of 15 years.

- The plan includes removal of phosphorus from Metro effluent. Phosphorus will be removed through high rate sand filtration and chemical addition and the Metro plant will be permitted at 0.1 mg/l. A $5 million phosphorus removal pilot will be conducted by the County with the goal of reaching 0.02 mg/l in effluent.

- Ammonia will be removed through upflow biological aerated filtration. The plant will be permitted for 2 mg/l in the summer and 4 mg/l in the winter.

- A hypolimnetic oxygenation project will be coordinated under a DEC-managed monitoring program, with the $1 million cost financed by NYS.

Technical Solution

Metro

Onondaga Lake suffers from excessive algae, high levels of turbidity, and chronic ammonia violations. A significant source of loadings that contribute to these problems is Onondaga County's Metro sewage treatment plant, located at the southeastern end of the Lake in the city of Syracuse. The plant is designed to process an average of 80 million gallons of sewage a day (mgd), with a maximum capacity of 120 mgd.

The Metro facility is the source of about 90% of the ammonia loading to the Lake. Ammonia causes aquatic toxicity and upsets the biological balance in the lake, so it must be controlled to achieve the goal of providing a viable sport fishery in the Lake. Additionally, the Metro facility is the source of about 60% of the phosphorus loading to the Lake. Phosphorus is the primary "fertilizer" contributing to growth of algae, which causes turbidity, odor problems, and contributes significantly to the lack of dissolved oxygen in the bottom waters of the Lake. Turbidity causes substantial visual impairment and prevents swimming. Insufficient dissolved oxygen prevents a year-round fishery for species that exist below the thermocline in the Lake.

The New York State plan calls for various improvements for the Metro plant to be made over a 8-10 year construction schedule. Metro's effluent discharge will continue to be in the Lake, rather than locating the outfall for discharge into the Seneca River. After consideration of other discharge alternatives, such as the River, the State believes that continued discharge into the Lake represents the least costly and controversial alternative. Political opposition to locating the outfall on the River, and transferring the effluent to another water body, raises a possibility that the improvements to the Lake would not occur for several years and would increase the eventual cost of the project. Instead, the Metro plant will be upgraded using the most advanced contaminant-removal technology available, ensuring both a cleaner Onondaga Lake that meets State standards and an improved Seneca River.

Interim Activities: The County will spend approximately $35 million dollars to do various operational upgrades. These include sampling, chlorination, process control, sludge handling, permanent phosphorus treatment and miscellaneous projects to improve their current operation and prepare for the upgrade at the plant. The County will no longer be required to perform interim steps to optimize ammonia removals since the chosen treatment technology does not rely on ammonia removal within the existing tankage.

Ammonia Removal: The plant will be required to treat to a monthly average ammonia discharge limit of 2.0 mg/l in the summer and 4.0 mg/l in the winter for its permit. The Department's proposed limits are consistent with values that are representative of criteria that EPA has under consideration.

Ammonia will be removed by the construction of upflow biological aerated filters. This is a modern, proven high rate technology which can reliably remove ammonia and provide a high quality effluent which will enhance the phosphorus removal capabilities of the final sand filters. This system is also cheaper compared to other ammonia-removal technologies because it requires lower operation and maintenance. With design, pilot, and full-scale upgrade, the ammonia removal process will cost $130 million.

Phosphorus Removal: The Department proposes a permitted twelve month rolling average phosphorus effluent limit of 0.1 mg/l. Phosphorus will be removed by the construction of high rate single-pass sand filtration and chemical addition. This combination of technology is equivalent to the best technology currently in use by a large metropolitan sewer district. Total phosphorus removal through filtration will cost $65 million.

This technology will reduce present phosphorus loadings to the Lake of 400 pounds/day to approximately 65 pounds/day, with a permit limit of about 0.1 mg/l on average. The mathematical water quality model developed to predict the effects of changing levels of loading into the Lake suggests that the limit should be 0.02 mg/l, which has not been achieved by a full scale treatment plant and would add as much as $100 million to the project. The "0.02" technology has only been demonstrated on an experimental basis in a small pilot plant.

To achieve lower phosphorus levels, and a visible change in turbidity, it will be necessary to establish a rigorous non-point source control program and go beyond existing phosphorus removal technology. The State will make money available for various non-point projects through the 1996 Clean Water/Clean Air Bond Act that will address phosphorus loading from agricultural sources and urban runoff. The effects of these projects will be analyzed though the proposed monitoring program.

Pilot Phosphorus Program: - Since the State still wishes to achieve 0.02 mg/l in Metro's phosphorus limit in order to approach the in-Lake guidance value for phosphorus, the plan calls for a phosphorus removal pilot program. The County will be required to pilot a demonstration-scale double filtration unit or an acceptable and approved alternative. In either case, the goal of the pilot will be achieving 0.02 mg/l phosphorus in effluent on a pilot and, eventually, a full-scale level. The pilot program will allow those monitoring the Lake to measure the effectiveness of the model in predicting water quality improvements, as well as testing innovative technology. Also, the removal of an additional level of phosphorus would speed the cycling of phosphorus out of the lake sediments which creates the majority of the hypolimnetic oxygen demand.

The proposed pilot could consist of double sand filtration, a technology that is being used at the Delhi plant to achieve phosphorus effluent levels of 0.02 mg/l. The Metro pilot will look to scale those results up on a much larger level, with the goal of eventually achieving 0.02 mg/l. The $5 million cost of the pilot will be financed by the County. The performance and results of the pilot will be overseen by the proposed Lake Monitor.

Pilot Hypolimnetic Aeration: An acceptable Municipal Compliance Plan must address water quality standards for dissolved oxygen throughout the lake including the hypolimnion (area below the thermocline). The current water quality model shows that even with achieving the ambient guidance value for phosphorus, the bottom waters will remain anoxic for most of the period of lake stratification. To address this problem, New York State will fund and conduct an In-lake Oxygenation Demonstration Project. The proposed Improvement Council consisting of EPA, Onondaga County, ASLF and outside experts will assist DEC in identifying management questions, developing the experimental design, providing peer review, and having a demonstration project work plan ready to implement by May 1998. The goal of the Demonstration Project will be to determine and report on the feasibility and suitability of implementing a lake-wide system to supplement point and non-point source controls for the attainment and maintenance of in-Lake dissolved oxygen standards. If lake-wide oxygenation is viable, the report will include a plan for such implementation, including:

- the recommended entity or entities that will be responsible for program implementation;
- the recommended full-scale rewritten program;
- the recommended implementation schedule;
- the estimated costs; and
- the recommended funding program -- total funding for the Project is estimated at $1 million.

Costs: Total Metro capital costs, including the pilots, are $236 million in present value. The State and EPA are advocating a construction schedule of 8-10 years.

Time Frame: The technology involved in this plan will help to significantly reduce the time necessary for piloting and demonstration projects. The BAF technology is simpler to scale up than other ammonia removal technologies, including the previously proposed "ring-lace", and the high rate single-pass sand filters do not require piloting. The design and construction of these are not contingent upon the completion of any of the interim projects so they can be performed simultaneously. The project could be completed for ammonia and phosphorus treatment by June 2004. The Metro improvements upgrade schedule is shown in Figure 1.

Figure 1: Onondaga County Municipal Compliance Plan Metropolitan Sewage Treatment Plant Upgrade Schedule

ACTION	PARAMETER	EFFLUENT LIMIT	AVERAGING PERIOD	COST (millions)	START PROJECT	END PROJECT
Implement No-Net Increase	Ammonia	15,200 lbs/day	30 day average	N/A	Immediate	
Implement No-Net Increase	Phosphorus	400 lbs/day	12 months rolling average	N/A	Immediate	
Implement Interim Projects	N/A	N/A	N/A	$35	Immediate	3/1/02
Pilot and Design Biological Aerated Filter	Ammonia	Summer 2 mg/l Winter 4 mg/l	30 day average	$5	6/1/97	10/1/98
Design and Implement Full Scale Upgrade For Nitrification	Ammonia	Summer 2 mg/l Winter 4 mg/l	30 day average	$125	10/1/98	12/1/01
Achieve Final Effluent Limits	Ammonia	Summer 2 mg/l Winter 4 mg/l	30 day average	N/A	12/1/01	6/1/02
Design and Bid High Rate Single Filters	Phosphorus	0.1 mg/l	12 month rolling average		6/1/01	6/1/02
Construct Filters	Phosphorus	0.1 mg/l	12 month rolling average	$65 (total P)	6/1/02	12/1/03
Achieve Final Effluent Limits	Phosphorus	0.1 mg/l	12 months rolling average	N/A	12/1/03	6/1/04

Proposed Pilot - Double Filtration Phosphorus Removal Construction Schedule

ACTION	PARAMETER	EFFLUENT LIMIT	AVERAGING PERIOD	COST (millions)	START PROJECT	END PROJECT
Pilot Innovative P Removal Technology	Phosphorus	Goal of 0.02 mg/l	12 month rolling average	$5	10/1/03	10/1/04
Design and Implement Additional Treatment	Phosphorus	Goal of 0.02 mg/l	12 month rolling average	$40	10/1/04	4/1/06

CSOs

The City of Syracuse sewer system is a combined sanitary and storm sewer system. For a combined system such as this, it is not practicable to collect all sewage flows and overflows at 62 locations to three tributary streams. These overflows are the primary source of bacteria and floating solids which impair swimming in Onondaga Lake. The floatable matter also causes visual and odor impairment to the lake and tributaries.

The combined sewer overflow abatement plan will involve the construction of ~~a large~~ relief sewers along Onondaga Creek which, along with some sewer separation, will consolidate 42 overflows to four locations. Two large vortex separator facilities will be constructed to provide removal of solid and floatable material and disinfection. Two smaller facilities will be constructed to remove floatable matter. The 18 overflows to Harbor Brook will be treated for retention, disinfection, and removal of floatables at one location at the mouth of the creek. There are several other components to the plan.

When finished, the project will allow bacterial standards to be met in 80% of the Lake allowing swimming in the northern half of the Lake (currently Class B swimming waters) if turbidity is low enough. The plan will provide almost complete control of floatable matter.

The total capital costs of the CSO plan are $144.0 million in present value and the project length is 15 years. The construction schedule and timetable for CSOs is contained in Figure 2.

Figure 2: CSO Project Construction Schedule

PROJECT	DESCRIPTION	DESIGN CRITERIA	TREATMENT OBJECTIVE	START PROJECT	COMPLETE PROJECT	PROJECT TERM	PROJECT COSTS (millions)
Interim Projects			Coliform/ Floatables	7/1/96	1/1/01	54 months	$23.43
EBSS Disinfection	Disinfection	As Built	Coliform	1/01/01	1/1/04	36 months	
Midland Avenue Conveyances	Relief Interceptor & Regulators	1 Year Storm	Eliminate CSOs	1/1/98	1/1/03	48 months	
Midland Avenue RTF	Vortex Concentrator Disinfection	1 Year Storm	Floatables Coliform	1/1/03	1/1/06	60 months	$74.54
Clinton St. Conveyances	Relief Interceptor & Regulators	1 Year Storm	Eliminate CSOs	1/1/02	1/1/06	48 months	
Franklin St. Conveyances	Relief Interceptor & CSOs	1 Year Storm	Eliminate CSOs	1/1/04	1/1/06	24 months	
Maltbie St. Conveyances	Relief Interceptor & CSOs	1 Year Storm	Eliminate CSOs	1/1/00	1/1/02	24 months	
Clinton St. RTF	Vortex Concentrator Disinfection	90th Percentile Storm	Floatables/ Coliform	1/1/06	1/1/11	60 months	$30.18
Franklin St. FCF	Netting Facility	90th Percentile Storm	Floatables	1/1/04	1/1/06	24 months	$3.2
Maltbie St. FCF	Netting Facility	90th Percentile Storm	Floatables	1/1/00	1/1/02	24 months	$2.54
Monitoring	Ambient Measurements	N/A	N/A	N/A	N/A		**$1.5**
Sewer Separation	Relief Interceptors	1 Year Storm	Eliminate CSOs				**$8.7**
Total Costs	N/A	N/A	N/A	N/A	N/A	N/A	**$144.09**

COUNTY OF ONONDAGA

DEPARTMENT OF DRAINAGE AND SANITATION

650 HIAWATHA BOULEVARD, WEST
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JOHN M. KARANIK
COMMISSIONER

January 10, 1995

Hon. Nicholas J. Pirro
County Executive
421 Montgomery Street
Syracuse, New York 13202

Dear Mr. Pirro:

I am pleased to submit to you nine copies of the following:

1. Proposed Municipal Compliance Plan and Draft Environmental Impact Statement.

2. Public Information Summary Document

As you are aware, the NYSDEC declared the models complete on October 13, 1995 a move which instituted a 90-day time frame, during which the above (Item 1) is required by the Consent Decree to be completed and submitted. Equally important, however, this time constraint prevented the completion of an issue-resolution process between technical staffs from the NYSDEC and my office. This process, as outlined by the NYSDEC and attached hereto, had proceeded for eight months and was embarked on to break an impasse between the two parties. Quoting from the document, "Due to the complexity of this... we believe it is necessary to segment the negotiations into major issues. Negotiations would be sequential not concurrent. This forces the parties to propose a settlement on each issue prior to commencing the next issue."

It goes without saying that a dilemma was created in that the above documents had to be prepared in a short period of time, prior to negotiations having been completed and agreements reached on numerous key issues. This latter point was mentioned by Assistant New York State Attorney General Norm Spiegel within his December 15, 1995 letter to Judge McAvoy.

The issues that continue to concern me personally are as follow:

- The lack of complete information on the timing and extent of parallel remediation of industrialcontaminants within the environs of Onondaga Lake.

- The level of County participation in the hypolimnetic oxygenation of Onondaga Lake, as introduced by the USEPA.

- The resolution of a process to address the long-term conceptual alternatives.

- Our inability, due to time limitations, to incorporate NYSDEC comments on significant portions of the enclosed documents.

- Our ability, regardless of projects, cost or timing, to attain the designated uses for Onondaga Lake.

- The uncertainties of non-County funding.

- The lack of a fisheries management plan for Onondaga Lake, as promised by the NYSDEC.

- The use of certain models for permitting purposes.

- The overall economic and financial impacts, despite the cost-effectiveness of the proposed projects.

Nevertheless, I am presenting to you a plan that:

- Represents our best effort at technical compliance and cost-effectiveness.

- Incorporates the total maximum daily load process (build and measure) in the complex water quality issues at stake.

- Increases levels of treatment at METRO to meet effluent limits anticipated to be established by the state.

- Meets compliance with state and federal combined sewer overflow requirements through the treatment of all CSO discharges.

- Satisfies the Consent Decree requirements.

- Can be submitted to the NYSDEC and Onondaga County Legislature for their respective reviews and considerations.

I would like to express my gratitude to all those individuals who in any way assisted in progressing this project to its current status. Their advice, wisdom, efforts, and sacrifices cannot be overstated.

I look forward to working with you through the next series of steps to be taken.

Respectfully,

DEPARTMENT OF DRAINAGE AND SANITATION

JOHN M. KARANIK
Commissioner

JMK:sm

ONONDAGA LAKE

There is a need to resolve issues relating to the SPDES permit for the Syracuse Metro Treatment Facility and associated combined sewer overflows. The Department will hold technical negotiations with Onondaga County to develop SPDES permit conditions to satisfy the essential elements of the MCP/DEIS process and start the process of improving the water quality of Onondaga Lake.

We are suggesting the following process for negotiation and a structure for permit settlement terms beginning with the issue of phosphorus and ammonia removal.

NEGOTIATION PROCESS

Our mutual goal is that a proposed settlement permit will be negotiated in lieu of protracted litigation or adjudication. Based on the Department's experience in over four years of issues conferences in the NYC SPDES permit hearings, we suggest the following scenario:

1. The Department and the County will designate a small group of technical staff for purposes of direct meetings and negotiations. Each party can use technical support outside of the direct meetings as they deem necessary.

2. The technical staff will propose a bi-lateral DEC-DDS settlement permit, which upon approval from appropriate superiors will be made available to the legal staff and other involved parties.

3. Due to the complexity of this permit and based on the success of the NYC SPDES proceeding, we believe it is necessary to segment the negotiations into major issues. Negotiations would be <u>sequential</u> not concurrent. This forces the parties to propose a settlement on each issue prior to commencing the next issue.

   We suggest the following issues and sequence which could be embodied in a rough schedule agreed to by DEC and DDS:

   A. Nutrients - Phosphorus/Ammonia
   B. Flow/capacity
   C. CSO

STRUCTURE OF SETTLEMENT FOR NUTRIENTS

1. The basic premise for the permit settlement is the Phased Total Maximum Daily Load (TMDL) process. The TMDL process as proposed under GLI states.

   "TMDLs shall, at a minimum, be established in accordance with the listing and priority setting process established in

section 303(d) of the Clean Water Act and at 40 CFR 130.7. Where water quality standards cannot be attained immediately, TMDLs must reflect reasonable assurances that water quality standards will be attained in a reasonable period of time. Some TMDLs may be based on attaining water quality standards over a period of time, with specific controls on individual sources being implemented in stages. Determining the reasonable period of time in which water quality standards will be met is a case-specific determination considering a number of factors including, but not limited to: receiving water characteristics, persistence, behavior and ubiquity of pollutants of concern, type of remediation activities necessary, available regulatory and non-regulatory controls, and individual State requirements for attainment of water quality standards.

A TMDL must ensure attainment of applicable water quality standards, including all numeric and narrative criteria, Tier I criteria, and Tier II values for each pollutant or pollutants for which a TMDL is established."

The Phased TMDL, is an iterative process of pollutant reduction with updating of other factors affecting water quality determinations such as non-point sources, best-use, monitoring etc.

The "reasonable progress and phased reduction" concept is employed in the Long Island Sound Study CCMP and is reflected in the NYC SPDES permits.

Using the NYC SPDES as a guideline we feel a credible settlement permit should have the following elements:

A. Effluent limits that freeze Total Phosphorus and Ammonia at 1995 mass loading rates based on existing STP operation.

B. A program to develop the Best Available Retrofit technologies for phosphorus and ammonia removal. The County would explore technologies and equipment that can be retrofitted to the Metro-STP without substantial expansion to structural facilities. The County must make a credible effort to leave "no-stone unturned" in maximizing phosphorus and ammonia removal. The Department will not dictate with specificity, but we expect the following "kinds of things" included in for a credible proposal:

- Biological Nutrient Removal technologies
- Aeration retrofit to maximize oxygen transfer efficiency (i.e. diffused aeration system.)
- Clarifier modifications
- Sludge return capacity
- Chemical addition
- Process side-stream treatment for P-removal

- Fixed media for high biomass (e.g. "ring-lace")
- Consideration of NH_3 reductions from Bristol-Meyers Squibb.

The County would present a proposed program with a schedule <u>and</u> establish mass load reduction goals for TP & NH_3. The goals and schedule would become part of the permit. Upon completion of the retrofit program with time allowed for start-up and shakedown, the achievable loads would be incorporated into the permit as limits.

By specifying an outcome-based program in terms of goals, the County has flexibility to modify the proposal as work proceeds.

The permit should look roughly like this:

1/1/96	•	Effluent limit for Total Phosphorus at 1995 levels <u>X</u> pounds/day
	•	Effluent limit for Ammonia at 1995 levels <u>X</u> pounds/day.
1/1/96	•	Set goals for additional Phosphorus Reduction at <u>X</u> pounds/day
	•	Set goals for additional Ammonia Reduction at <u>X</u> pounds/day.
1/1/96 + 3-5 yrs.	•	Implement technology program to meet reduction goals.
3/1/96 + 4-6 yrs.	•	Set effluent limits for phosphorus and ammonia to achievable levels.

Other elements for consideration are a pilot program to identify high-rate space-saving technologies and post-implementation monitoring and studies of Onondaga Lake.

If the county agrees to develop a settlement permit based on the above structure or equivalent we believe the result will be a credible/defensible SPDES permit for public notice.

Subsequent to agreement on the negotiation process, the Department will develop a similar framework for the issues of Combined Sewer Overflow Abatement and Treatment Capacity.

Municipal Compliance Plan

Onondaga County
Wastewater Collection and Treatment

Prepared by

Office of the County Executive
Onondaga County Department of Drainage and Sanitation
Onondaga County Office of the Environment
Syracuse-Onondaga County Planning Agency
Onondaga County Department of Law
Onondaga County Finance Division of Management and Budget
Onondaga County Water Quality Management Agency
Stearns & Wheler, Environmental Engineers and Scientists
Moffa & Associates
Blasland, Bouck & Lee
Government Finance Associates
Camp, Dresser and McKee
Jim Napoleon & Associates

MUNICIPAL COMPLIANCE PLAN
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LIST OF ACRONYMS

AADT	Annualized Average Daily Traffic
AAQS	Ambient Air Quality Standard
ASLF	Atlantic States Legal Foundation
BOD	Biological Oxygen Demand
BOD_5	Biological Oxygen Demand - 5 Day
BMP	Best Management Practices
BPJ	Best Professional Judgement
BTT	Best Treatment Technology
CBD	Central Business District
$CBOD_5$	Carbonaceous Biological Oxygen Demand
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CISER	Cornell Institute of Social and Economic Research
CPE	Comprehensive Plant Evaluation
CSO	Combined Sewer Overflow
CSS	Combined Sewer System
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
DO	Dissolved Oxygen
EAF	Environmental Assessment Form
EBSS	Erie Boulevard Storm Sewer
EFC	Environmental Facilities Corporation
ELAP	Environmental Laboratory Accreditation Program
ENR	Engineering News Record
ETI	Environmental Technology Initiative
FCF	Floatables Control Facility
FDA	Food and Drug Administration
GEIS	Generic Environmental Impact Statement
HBIS	Harbor Brook Interceptor Sewer
HgT	Total Mercury
ISTEA	Intermodel Surface Transportation Efficiency Act
LOS	Level of Service
LTCP	Long-term Control Plan
MCP	Municipal Compliance Plan
MCRT	Mean Cell Residence Time
MDA	Metropolitan Development Authority
METRO	Metropolitan Syracuse Wastewater Treatment Plant
MIS	Main Interceptor Sewer
MSA	Metropolitan Statistical Area

LIST OF ACRONYMS (continued):

NMC	Nine Minimum Controls
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOL	New York State Department of Law
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
NYSERDA	New York State Energy Research and Development Authority
NYSOPRHP	New York State Office of Parks, Recreation and Historical Preservation
OCDDS	Onondaga County Department of Drainage and Sanitation
OCIDA	Onondaga County Industrial Development Agency
OLMC	Onondaga Lake Management Conference
PAH	Poly Aromatic Hydrocarbons
POTW	Publicly Owned Treatment Works
PWP	Priority Water Problem
PTI	PTI Environmental Services, Inc.
REMI	Regional Economic Models, Inc.
RI/FS	Remedial Investigation/Feasibility Study
ROW	Right of Way
RTF	Regional Treatment Facility
SCADA	Supervisory Control and Data Acquisition
SEQR	State Environmental Quality Review
SIDA	Syracuse Industrial Development Agency
SOD	Sediment Oxygen Demand
SORWG	Senaca/Oswego River Working Group
SPDES	State Pollution Discharge Elimination System
SRF	State Revolving Loan Fund
SRP	Soluble Reactive Phosphorus
SSO	Sanitary Sewer Overflow
STP	Sewage Treatment Plant
SWMM	Storm Water Management Model
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOGS	Technical and Operational Guidance Series
TP	Total Phosphorus
TSS	Total Settleable Solids
UDC	Urban Development Corporation
UFI	Upstate Freshwater Institute
USACOE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geologic Survey
WEF	Water Environment Federation
WQS	Water Quality Standards
WSE	Waste Stream Environmental, Inc.
WWTP	Wastewater Treatment Plant

Section One

CHAPTER 1 - BACKGROUND INFORMATION
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CHAPTER 1

BACKGROUND INFORMATION

1.0 INTRODUCTION

In January 1989, Onondaga County executed a Judgment on Consent with the State of New York and the Atlantic States Legal Foundation (ASLF) in settlement of litigation initiated in connection with alleged violations of state and federal water pollution control laws. The conditions of the Judgment on Consent obligated the County to perform a series of engineering and scientific studies to evaluate the need for upgrading of the Metropolitan Syracuse Sewage Treatment Plant (METRO) and for providing treatment of combined sewer overflows (CSOs) that occur within the METRO service area. This report, together with the separately bound Draft Environmental Impact Statement (DEIS) and Appendices, summarizes the results of these evaluations and proposes a cost-effective strategy for remediation of water quality impacts associated with METRO and CSOs that is equitable with other non-County-related lake remediation efforts.

Figure 1-1 presents a map of the project area. Onondaga County is located in central New York and is bounded by Oswego County to the north, Madison County to the east, Cortland County to the south, and Cayuga County to the west. The METRO service area is located in approximately the center of the County and includes the City of Syracuse and surrounding suburbs.

The METRO plant is located at 650 Hiawatha Boulevard West at the south end of Onondaga Lake. Treated effluent is discharged from METRO to the lake, which is part of the Seneca-Oswego River drainage basin. The Onondaga Lake drainage basin is contained almost entirely within Onondaga County's boundaries. Major tributaries to the lake include Nine Mile Creek, Onondaga Creek, Harbor Brook, Ley Creek, and Sawmill Creek. Combined sewer overflows generated within the METRO service area are discharged to Onondaga Creek, Harbor Brook, and Ley Creek.

1.1 METRO SYRACUSE SEWAGE TREATMENT PLANT AND SERVICE AREA

A. **General Information.** The METRO plant is an 80 mgd advanced wastewater treatment facility. The facility is owned by the Onondaga County Sanitary District and is operated by the Onondaga County Department of Drainage and Sanitation (OCDDS). Funding for capital improvements, as well as operation and maintenance of the facility, is authorized by the Onondaga County Legislature.

During the late 1970s and early 1980s, construction of additions and modifications to the METRO plant were completed to increase capacity (from 50 mgd to 80 mgd) and to provide a higher level of wastewater treatment [from chemically enhanced primary treatment to advanced treatment for biochemical oxygen demand (BOD) and phosphorus removal]. These additions and modifications were based on wastewater facilities planning and design efforts completed during the 1960s and early 1970s.

B. **METRO Service Area.** The METRO plant serves the municipal wastewater treatment needs of the metropolitan Syracuse area (Figure 1-2). This area includes the City of Syracuse; the Town of Salina, including the Village of Liverpool; the northern section of the Town of Dewitt, including the Village of East Syracuse; the Town of Geddes, including the Village of Solvay; the southeastern section of the Town of Camillus, including the Village of Camillus; and the northeastern section of the Town of Onondaga.

Raw sewage is conveyed to the METRO plant from five major sewer service areas: (1) the main interceptor sewer (MIS) service area; (2) the Harbor Brook interceptor sewer (HBIS) service area; (3) the Ley Creek service area; (4) the Liverpool service area; and (5) the Westside service area. Flows from the MIS and HBIS service areas are conveyed by gravity to the METRO plant site. Both of these service areas are served by combined sanitary and storm sewers. Flows from the Ley Creek, Liverpool, and Westside service areas are pumped to the METRO plant site. These areas are served by separate sanitary sewers.

Information on population and growth trends in the METRO service area is presented in Section 2.2.2C of the DEIS.

C. **Original Basis of Design.** The existing METRO site (Figure 1-3) is bounded by Onondaga Lake, the Barge Canal, Hiawatha Boulevard, an electrical substation owned and operated by Niagara Mohawk Power Corporation (NiMo), and a scrap metal salvage yard owned and operated by Roth Steel. The NiMo property, which is surrounded by the METRO site, was the site of a former manufactured gas plant.

The area surrounding the METRO site has been targeted for redevelopment efforts. A discussion of redevelopment plans, which include the Carousel Center, Carousel Landing, and Inner Harbor development is presented in Section 2.2.2B of the DEIS. The property currently owned by the County offers little opportunity for significant expansion of process tankage. The County has made preliminary inquiries into the possibility of acquiring the NiMo site for expansion. NiMo is currently under consent order with NYSDEC to investigate the extent of coal tar and associated contamination remaining from the former manufactured gas plant. If the County were to acquire the site, a redevelopment project may be possible consistent with New York State's "Brownfields" development initiative. The Brownfields approach allows reuse of industrial properties based on a risk assessment approach to site-specific cleanup objectives. Expansion difficulties are compounded by the poor soil conditions at the existing plant site, which make necessary the use of special foundation designs for structures, process tankage, and major piping.

Figures 1-4 and 1-5 present the wastewater and sludge process flow schematics for the METRO plant. Wastewater treatment consists of raw sewage screening and grit removal, primary settling, activated sludge aeration, secondary clarification, effluent disinfection by chlorination, and tertiary settling. Primary, waste-activated, and tertiary sludges are combined for dewatering and stabilization by gravity thickening, anaerobic digestion, and belt filter press dewatering. Dewatered sludges are further treated by the N-Viro soil process prior to ultimate distribution for beneficial use.

The basis of design for METRO was established in the Wastewater Facilities Report prepared by the County's consultant (O'Brien & Gere Engineers, Inc., November 21, 1969, and December 1, 1972) and approved by the New York State Department of Environmental Conservation (NYSDEC) and the U.S. Environmental Protection Agency (USEPA) on December 5, 1972.

1. **Sewage Flows and Loadings.** Projected sewage flows that were used as the basis of design for expansion and upgrading of the METRO plant are summarized in Table 1-1. As stated in the Wastewater Facilities Report, the plant was designed to provide full treatment (including influent wastewater screening and grit removal, primary settling, activated sludge aeration, secondary clarification, chlorination, and tertiary treatment for phosphorus removal by chemical precipitation using lime), for all flows up to a projected peak dry weather flow rate of 120 mgd. During wet weather conditions when flows were expected to exceed 120 mgd (projected frequency of one to two times per month), the plant design provided for activation of primary and secondary bypasses, such that the incremental flows in excess of 120 mgd would receive treatment consisting only of influent screening and grit removal, primary settling, and chlorination prior to discharge to Onondaga Lake via a separate stormwater outfall.

Wastewater characteristics that were used as the basis of design for the METRO plant are summarized as follows:

Average daily BOD (5-day)	200 mg/l 133,000 lbs/day
Average daily suspended solids	180 mg/l 120,000 lbs/day

2. **Effluent Limitations and Treatment Requirements.** Table 1-2 summarizes the effluent limitations established by NYSDEC for the METRO plant in the State Pollutant Discharge Elimination System (SPDES) permit issued following the plant upgrade. The limitations required advanced treatment for BOD and phosphorus removal for all flows up to 120 mgd. No effluent limitations were established by NYSDEC for the plant stormwater outfall.

3. **Wastewater Treatment Systems and Sizing Criteria.** After expansion of METRO from a primary to an advanced secondary treatment facility, major treatment units included the following:

- "New" screenings and grit building
  - Inlet mechanically cleaned trash racks (2)
  - Aerated grit chambers (2)
  - Outlet mechanically cleaned bar screens (2)
- "Old" screenings and grit building
  - Hand-cleaned trash racks (3)
  - Aerated grit chambers (3)
- Raw sewage pump station
- Primary distribution structures (2)
- Primary clarifiers (8)
- Primary effluent bypass structures (2)
- Secondary distribution structures (2)
- Activated sludge aeration tanks (8)
- Secondary clarifiers (4)
- Secondary effluent chlorine contact tanks (4)
- Tertiary pump station
- Tertiary clari-flocculation tanks (6)
- Bypass chlorine contact tanks (2)
- Gravity sludge thickeners (3)
- Anaerobic digesters (4)
- Sludge disposal pump station
- Emergency centrifuge sludge dewatering facilities
- Allied Chemical Company holding pond
- Allied Chemical Company pump station

Design of the aeration tanks provided flexibility for operation of either a contact stabilization activated sludge process or a conventional (high-rate) activated sludge process. An inventory of major treatment unit processes and their design criteria are presented in Table 1-3.

4. **Sludge Treatment and Disposal.** Plant design provided for facilities to pump tertiary chemical sludge, along with anaerobically digested primary and waste-activated sludge, to waste beds operated by the AlliedSignal Corporation for co-disposal with industrial wastes. As an alternative to sludge disposal to the AlliedSignal waste beds, standby centrifuge sludge dewatering facilities were provided for sanitary landfill disposal of dewatered sludge.

5. **Wastewater Collection Sizing Criteria.** An analysis was conducted as part of the CSO Facility Plan to determine the carrying capacity of the principal combined trunk sewers. This analysis found that many of the trunk sewers could transmit flows up to the 1-year storm (a storm which can be equated or exceeded statistically once per year), but

there is limited capacity beyond that point. Tables 1-4 and 1-5 demonstrate the collective peak discharge rates associated with several storm intensities, as calculated by the Stormwater Management Model (SWMM) for the Onondaga Creek and Harbor Brook drainage basins, respectively. The peak discharge rates for overflows on the Onondaga Creek and Harbor Brook basins have been totaled and presented graphically in Figure 1-6. As shown in the figure, there is a distinct break of the curve at the one-year storm intensity. This indicates that design storms with greater intensity than the 1-year storm (2-year, 5-year, and 10-year) do not result in significantly higher CSO discharge rates. This is an important factor in determining the sizing criteria for pipelines to consolidate the different overflow points into regional areas.

The interceptor sewer network includes the MIS and the HBIS, which were designed to convey approximately three times the average daily flow (ADF) to METRO. As such, they have the capacity to transport a portion of the collection system's infiltration and runoff.

Figures 1-7 and 1-8 illustrate the capacity of the MIS and HBIS in addition to the capacity of the regulator sewers. The cumulative capacity of the regulator sewers is also demonstrated on these figures. As shown on these figures, the cumulative regulator capacity exceeds the capacity of the interceptors. This is an important consideration for the goal of maximizing flow to METRO during wet weather periods.

D. **Major Changes Since Basis of Design.** Major changes in operating conditions have occurred since startup of the upgraded METRO plant. These changes include removal of the Ley Creek sewage treatment plant from service in June 1980; closure of the AlliedSignal Corporation in early 1986, execution in September 1992 of a 10-year contract with Waste Stream Environmental, Inc. (WSE) for biosolids management utilizing the N-Viro soil process; construction of plant improvements following the completion of a Comprehensive Plant Evaluation (CPE); and the implementation of "best management practices" for CSOs. The following sections provide brief discussions of these changes.

1. **Closure of Ley Creek Sewage Treatment Plant.** The original basis of design for METRO included continued operation of the Ley Creek sewage treatment plant as a pretreatment facility for the high-strength, largely industrial wastewater flow generated

within the Ley Creek sewer service area. In response to successful startup of the METRO plant, and in recognition of the need for major rehabilitation of the Ley Creek plant, a wastewater facilities planning study was performed by the County to evaluate the feasibility of discontinuing operation of the Ley Creek plant. The findings and conclusions of this study were summarized in a final report prepared by the County's engineering consultant (Calocerinos & Spina, January 1983). It was recommended that the Ley Creek plant could be decommissioned, provided that the County implemented an effective monitoring and enforcement program to control industrial wastewater discharges from Bristol Laboratories. The recommendations of the study were implemented by the County, and the Ley Creek plant remains out of service today. Because the Ley Creek plant has been out of service for more than 15 years, the facilities have deteriorated to such an extent that they can no longer be operated.

2. **Closure of AlliedSignal Corporation.** The original basis of design for METRO included the utilization of residual lime present in industrial wastewater generated by the AlliedSignal Corporation (Allied) for the removal of phosphorus from wastewater by chemical precipitation in tertiary settling tanks. In addition, the plant design included disposal of anaerobically digested primary and waste-activated sludges along with tertiary chemical sludge in liquid form to the waste beds operated by Allied. In response to closure of the Allied facility in 1986, the following changes were implemented at METRO:

a. **Construction of Temporary Phosphorus Removal Facilities.** Temporary liquid chemical storage and feed facilities were installed and placed in service on April 17, 1986. These facilities are used for chemical precipitation of phosphorus using iron salts (ferrous sulfate, ferrous chloride, or ferric chloride). Tertiary precipitation of phosphorus using lime present in wastewater flows from the Allied waste beds was discontinued.

b. **Construction of Belt Filter Press Sludge Dewatering Facility.** Temporary belt filter press sludge dewatering facilities were installed and placed in operation on August 24, 1986. Concurrently, the County installed a centrifuge to dewater sludge and supplement the belt press operation. While the temporary facilities were in operation, the County, with its engineering consultant, fast-tracked the design and construction of a permanent belt press dewatering facility, which was placed in operation on April 17, 1987.

c. **Treatment of Stormwater Runoff from Allied Waste Beds.** Flows from the Allied waste beds were relocated from the tertiary clarifiers to the plant influent on April 30, 1986. At present, METRO continues to treat stormwater runoff from the waste beds. This practice, however, will be discontinued.

3. **Biosolids Management.** Waste Stream Environmental (WSE) began processing County biosolids using the N-Viro soil process on a temporary basis in June 1991. In a short-term agreement lasting through November 1992, WSE committed to the processing of 100 wet tons of biosolids per day using the N-Viro soil process, under a NYSDEC Part 360 permit, at the Meadowbrook-Limestone wastewater treatment plant.

A Request for Proposals for a 10-year biosolids management services contract was issued on January 9, 1991, and proposals were received on February 20, 1991. On May 20, 1991, WSE was selected as the preferred vendor, and negotiations for a long-term service agreement were finalized on September 29, 1992. Phase I of the N-Viro soil facility at the METRO site included construction of a windrow building, and was completed in mid-1993. Phase II construction was completed in February 1994. Also in February, a NYSDEC Part 360 permit was issued for processing 240 wet tons of biosolids per day. A 30-day acceptance test on the mechanical equipment was completed on March 20, 1994, and final acceptance of the N-Viro soil process was achieved on June 24, 1994.

4. **CPE Modifications.** Modifications to unit processes to improve plant performance were initiated in April 1993. Replacement of the primary sludge pumps was completed in July 1993. Modifications to improve operability of the secondary clarifier and aeration tanks were completed in November 1993. Cleaning and renovation of the three primary digesters to improve mixing and provide additional insulation was completed in November 1994. Preliminary design work is presently underway for conversion of the secondary digester to a primary digester in order to increase sludge stabilization capacity and improve sludge dewaterability.

5. **CSO Best Management Practices.** In 1972, the OCDDS began to acquire the major interceptor and trunk sewers from the City of Syracuse. Prior to 1972, the combined sewer system was operated exclusively by the City of Syracuse Department of Public Works and did not receive adequate maintenance. Many of the major trunk sewers were in need of extensive cleaning and repairs. Overflow structures frequently leaked. During periods of high stream flow, creek water would flow into the combined sewer system due to the lack of backflow gates, resulting in hydraulic overloading of the collection system. The situation was such that dry weather overflows from the collection system were commonplace. The acquisition of the major collection facilities by OCDDS and subsequent sewer system evaluation survey efforts led to the formulation of the Best Management Practices (BMP) program recommendations contained in the 1979 Final Report (O'Brien & Gere).

The non-structural BMP improvements implemented as a result of the 1979 Final Report included:

a. Cleaning approximately 26,300 linear feet of trunk and interceptor sewer.

b. Modifying 62 overflow manholes, including the vast majority of overflows.

c. Enlarging the diameter of nine regulator pipes to more fully utilize the capacities of the MIS and HBIS.

The BMP program also included the following structural improvements:

a. Reconstruction of 3,400 linear feet of the HBIS due to settlement of associated lateral sewers and a pumping station.

b. Construction of pumping stations at Taylor Street (MIS basin) and Sackett Street (HBIS basin).

c. Conversion of the Erie Boulevard Storm Sewer into a 5 million gallon (off-line) storage basin through installation of four automatic sluice gates and the James Street relief sewer. This automated system experienced mechanical and instrumentation control failures and never became operational.

BMP improvements were made between September 1982 and December 1985 at a cost of approximately $10 million. This represented a significant first step in reducing the magnitude and duration of overflow events. Comparison of pre- and post-BMP conditions at a number of CSO discharge points indicates that a greater than 85 percent reduction in CSO volume was effected by this program. By implementing this program, Onondaga County has already achieved many of the BMP program objectives of the New York State CSO Control Strategy and the federal CSO Control Policy.

A complete listing of BMP program improvements has been included as Table 1-6.

E. SPDES Permit and METRO Performance History.

1. SPDES Permit History.

a. **1970s.** In December 1973, the first application for a National Pollutant Discharge Elimination System (NPDES) permit was submitted for the METRO plant. The permit, issued on January 31, 1975, and effective until January 31, 1980, specified effluent limitations for BOD_5 and total suspended solids (TSS) as follows:

- Maximum 30-day average effluent BOD_5 = 30 mg/l and 10,100 lb/day
- Maximum 7-day average effluent BOD_5 = 45 mg/l and 15,100 lb/day
- Maximum 30-day average effluent TSS = 30 mg/l and 21,600 lb/day
- Maximum 7-day average effluent TSS = 45 mg/l and 32,400 lb/day

Monitoring of ammonia, total Kjeldahl nitrogen (TKN), and phosphorus was required to determine the effects of the METRO discharge on Onondaga Lake.

The "Onondaga County Rules and Regulations Relating to Use of the Public Sewer System" was approved by the USEPA in July 1976. The Rules and Regulations required system users to comply with concentration-based limitations for selected parameters.

During 1977, NYSDEC issued a draft SPDES permit that became effective in 1980. The effluent limitations in this permit for BOD_5 and TSS were as follows:

- Maximum 30-day average effluent BOD_5 = 14 mg/l and 10,100 lb/day
- Maximum 30-day average effluent TSS = 30 mg/l and 21,642 lb/day
- Maximum 7-day average effluent TSS = 45 mg/l and 32,463 lb/day

In addition, a maximum 30-day average effluent limit of 1.0 mg/l was established for phosphorus.

b. **1980s.** A draft SPDES permit was issued on March 24, 1981 and finalized on August 1, 1981. This permit added a requirement for $CBOD_5$, replacing the BOD limitation. Also, a maximum 7-day average effluent limit of 21 mg/l and 15,150 lbs/day was established for $CBOD_5$. This permit was modified on November 14, 1983, to include a provision restricting the discharge to 120 mgd from Outfall 001. In April 1984, the USEPA formally approved the County pretreatment program, designating the County as the control authority responsible for implementation and administration of the federal regulations for control of non-domestic discharges. In December 1984, the SPDES permit was modified, changing the $CBOD_5$ limit to BOD_5.

In 1985, a permit modification was received that included an ammonia limit of 1,500 lbs/day and a total residual chorine (TRC) limit. In August 1985, Onondaga County requested a change in the BOD_5 limit to 30 mg/l and requested justification for the ammonia and TRC limits. In January 1986, the NYSDEC responded to the request and agreed not to include the limit for ammonia until additional water quality data was collected.

In December 1986, another draft SPDES permit was transmitted by the NYSDEC. The County's comments on this draft permit included objections to the reporting requirements for CSO discharges, the secondary treatment requirement for overflow pump stations during high flow conditions, and the proposed BOD_5 limit. The County also requested that the NYSDEC justify the proposed TRC limit. Discussion of these issues by the NYSDEC and the County continued during 1987 via an administrative law format. On November 16, 1987, the County received notice of ASLF's intent to sue for violations of the effluent discharge limit. A third-party citizens suit was filed on January 19, 1988 by ASLF. Throughout 1988, a consent agreement was negotiated by ASLF, NYSDEC, and the County. On January 31, 1989, the consent order was signed, thus invoking the permit limits contained within the agreement. The effluent limitations for BOD_5 and TSS were as follows:

- Maximum 30-day average effluent BOD_5 = 21 mg/l and 14,011 lb/day
- Maximum 7-day average effluent BOD_5 = 31.5 mg/l and 21,017 lb/day
- Maximum 30-day average effluent TSS = 30 mg/l and 20,016 lb/day
- Maximum 7-day average effluent TSS = 45 mg/l and 30,024 lb/day

The maximum 30-day average effluent limit for phosphorus remained at 1.0 mg/l.

c. **1990s.** On September 10, 1991, the County received notification that the NYSDEC would modify the SPDES permit to include Tier 1 and Tier 2 toxicity testing. In February 1992, the NYSDEC responded to County comments and indicated that the toxicity testing would be necessary. On June 29, 1992, the NYSDEC notified the County of intent to modify the METRO permit to include new effluent limits for heavy metals and organic compounds. The County submitted its comments on these limits on January 15, 1993. On October 10, 1993, the USEPA approved the County's request for modifications of its industrial pretreatment program, allowing beneficial reuse of METRO's biosolids as a soil amendment.

In a letter to the County dated October 27, 1995, the NYSDEC began the process of formally modifying and renewing the METRO SPDES permit.

2. **METRO Performance History.** Monitoring of the METRO effluent is performed by the OCDDS on a daily basis for BOD_5, suspended solids, phosphorus, and ammonia,

and twice per week for TKN. These data are summarized and reported on monthly performance reports, which are submitted to the NYSDEC in accordance with SPDES permit reporting requirements. For the purpose of this report, historical monitoring data were compiled and analyzed. These data are summarized in Tables 1-7 through 1-11, and are graphically illustrated in Figures 1-9 through 1-13.

a. **Compliance with Flow Limit.** The current SPDES discharge permit for METRO includes a maximum 30-day average flow limit of 80 mgd. Based on analysis of flow monitoring records, monthly average sewage flows have exceeded this limit 15 times over the six-year period of record (21 percent of the time). Re-rating of the flow capacity as defined in the SPDES permit will be necessary to better reflect the actual design flow on October 27, 1995. NYSDEC proposed a SPDES permit modification to change the averaging period for the flow limit from a 30-day average to a 12-month rolling average to better reflect the design capacity of the treatment plant. Revision of the averaging period for the flow limit will allow the County maximum treatment for peak wet weather flows at METRO in accordance with the federal CSO policy.

b. **Compliance with BOD Limit.** As shown in Table 1-7, monthly average METRO effluent BOD concentrations have ranged from 12.1 mg/l to 25.4 mg/l over the six-year period of record. Monthly average BOD concentrations have exceeded the current interim limit of 21 mg/l eight times during the 72-month period of record (11 percent of the time). Monthly average effluent BOD concentrations have been in consistent compliance with the federally defined minimum level of secondary treatment for municipal sewage treatment plants (30 mg/l BOD_5) over the entire period of record.

c. **Compliance with Suspended Solids Limit.** As shown in Table 1-8, monthly average METRO effluent suspended solids concentrations have ranged from 5.1 mg/l to 16.3 mg/l over the six-year period of record. These levels are well within the maximum allowable concentration of 30 mg/l required by the SPDES permit.

d. **Compliance with Phosphorus Limit.** Monthly average METRO effluent phosphorus concentrations have ranged from 0.16 mg/l to 1.31 mg/l over the six-year period of record and have exceeded the 1 mg/l of SPDES permit limit seven times during that period (10 percent of the time). As shown in Table 1-9, all of these exceedances were recorded during 1987 and 1988. Since initiation of the full-scale phosphorus testing program, which was performed at METRO between July 1988 and March 1991 in accordance with the NYSDEC consent order, no exceedances of the 1 mg/l limit have been recorded.

e. **Compliance with Other Parameters.** The following summarizes historical compliance with other parameters contained in the METRO SPDES discharge permit:

1) **Settleable Solids** (87 violations). The settleable solids violations were caused by high flows entering the treatment plant. During periods of high flow, solids washout from the clarifiers has occurred. This was related to poor secondary clarifier design, as indicated in the Final Report for the CPE (Stearns & Wheler, May 1989). This condition was particularly apparent in June 1989, when one-quarter of the secondary clarifier capacity was off line for weir leveling.

The violations occurring in October, November, and December of 1992 were attributable to reduced treatment capacity resulting from shutdowns related to construction at METRO. During this time period, one-half of the total secondary clarifier capacity was out of service while modifications were being made. "A"-side aeration tanks and secondary clarifiers were out of service, making the total secondary capacity of the plant 60 mgd. Flows over 60 mgd received primary treatment and chlorination.

2) **Fecal Coliform 7-day Geometric Mean** (one violation - August 1989). This violation was caused by difficulty in maintaining the chlorine residual. The suspected cause of the problem was partial nitrification occurring in the aeration tanks, which increased chlorine demand above normal levels, making chlorine residual control very difficult.

3) **Cyanide Loading** (18 violations). In response to cyanide violations at the treatment plant, the County commissioned Blasland, Bouck & Lee Engineers to evaluate the cause(s) of the problem. A final report issued in August 1992 concluded that the reported apparent cyanide exceedances might be due to false positive analytical values resulting from interferences associated with the testing methods used for total cyanide and cyanide amenable to chlorination analyses. The report recommended that the weak acid dissociable (WAD) method be used for cyanide analysis. Presently, the County is trying to eliminate interferences associated with the test methods employed. In the October 27, 1995 SPDES modification, NYSDEC proposed modifying the SPDES permit limit for cyanide using the published practical quantitation limit for the most sensitive laboratory analytical methodology contained in the NYSDEC Division of Water publication entitled "Analytical Detectability and Quantitation Guidelines for Selected Environmental Parameters."

4) **Chlorine Residual** (one violation - August 1990). The suspected cause of the chlorination control problems was partial nitrification occurring in the aeration tanks. The increased chlorine demand made residual control very difficult, as chlorine analysis is performed six times per day. The chlorine feed rate is adjusted manually immediately following chlorine residual analysis.

1.2 REQUIREMENTS OF JUDGMENT ON CONSENT

The January 1989 Judgement on Consent obligated the County to make improvements at the Ley Creek and Liverpool pump stations, to undertake a full-scale phosphorus removal testing program at METRO, to conduct a series of studies to determine a list of management alternatives for METRO and CSOs that would alleviate the impact on Onondaga Lake, and to undertake a program for abating extraneous flow into METRO resulting from improper connections to the sanitary sewer system. These programs have been completed, and the results are summarized in Appendix C-1.

1.3 RELATIONSHIP OF THE PROJECT TO OTHER ONONDAGA LAKE CLEANUP ACTIVITIES

A. **Inactive Hazardous Waste Sites in the Onondaga Lake Watershed.** NYSDEC publishes annual and quarterly status reports of inactive hazardous waste disposal sites in New York State. The latest quarterly report published in July 1995 lists 37 inactive hazardous waste sites in Onondaga County, 24 of which are located within the Onondaga Lake watershed basin. A list of these sites is presented in Table 1-12.

NYSDEC has assigned a priority classification for each of the listed inactive hazardous waste sites indicating the site's status with regard to remediation and closure. Class 2 sites are those that pose a "Significant threat to public health and the environment - Action required." Fifteen of the 24 sites have been designated as Class 2 sites. Class 2a (4 of 24) is a "Temporary classification assigned to sites that have inadequate and/or insufficient data for inclusion in any other classification." Class 3 sites (3 of 24) are those that "Do not present a significant threat to the public health or the environment - Action may be deferred." A Class 4 designation (2 of 24) indicates a situation where the "Site is properly closed - Requires continued management."

These sites may be significant sources of priority pollutant metals and organics. Crucible Steel discharges on the west side of Onondaga Lake have been documented to contain priority pollutant metals, including cadmium, chromium, copper, lead, and zinc (Onondaga County, 1990). AlliedSignal Corporation has been identified as the party responsible (along with LCP Chemical) for three of the Class 2 sites adjacent to Onondaga Lake. AlliedSignal operated two chlor-alkali facilities (Willis Avenue and Bridge Street, now known as LCP Chemical), which have been found to be significant sources of mercury to Onondaga Lake. The AlliedSignal tar beds have been found to be a source of chlorinated benzene, benzene, toluene, ethylbenzene, xylene, and polycyclic aromatic hydrocarbons. AlliedSignal and LCP Chemical are currently performing remedial investigations and feasibility studies (RI/FS) to determine the nature and extent of this contamination and to evaluate various lake cleanup technologies (OLMC, 1993).

Spills and discharges from the area known as Oil City (including the McKesson Environmental Site), located on the east side of the lake, may have been a significant source of petroleum groundwater contamination. New York State is actively investigating this matter and is discussing the terms of a consent decree with various oil companies to address this problem.

Finally, a number of inactive hazardous waste sites and sources of PCBs are present in the Onondaga watershed, including the Ley Creek PCB sediment site, Syracuse Fire Training School site, Val's Dodge site, Quanta Resources site, Salina town landfill, and the G.E. Farrell Road site (NYSDEC, July 1995).

B. **Onondaga Lake National Priorities List.** In December 1994, USEPA placed Onondaga Lake on the National Priorities List (NPL), thereby identifying the lake as one of the nation's most significant inactive hazardous waste sites. A public health assessment by the New York State Department of Health for the United States Department of Health and Human Services, dated July 24, 1995, concluded that the lake is a public health hazard. This finding was based primarily upon the dangers of consuming fish from the lake and from recreational uses, particularly swimming, due to potential exposure to harmful bacteria.

The health threat associated with recreational uses is linked to conventional water pollution problems, including raw sewage discharges. Based upon currently available information, hazardous substances do not preclude use of the lake for recreational purposes. However, health risks associated with the consumption of fish taken from the lake are related to the hazardous substance pollution of the lake.

The chief contaminants found in Onondaga Lake fish which elicit health concerns are mercury and polychlorinated byphenols (PCBs). The degree to which hazardous substances otherwise impact the viability of the lake's natural resources is yet to be determined. The ecological risk analyses required to address this question, as well as any additional human health risk assessment work, are components of the NPL site remedial program discussed further below.

Lead responsibility for managing NPL sites is normally USEPA duty. However, in the case of the Onondaga Lake, NYSDEC sought and was granted lead agency status for these responsibilities. NYSDEC receives grant funding from USEPA for this role. NYSDEC's lead role is well justified given that NYSDEC was already involved with a number of different remedial projects in and around the lake, including an ongoing remedial investigation of the lake being conducted by AlliedSignal under a consent decree with the state. For Onondaga Lake, USEPA provides oversight and consultation to ensure the site's remedial program is consistent with federal requirements and policies.

The Onondaga Lake NPL site is generally defined as the lake itself, its tributaries, and any areas which release, have released, or threaten to release hazardous substances to the lake or its tributaries. Certain specific areas of concern have been identified for which remedial program are underway or soon to begin. The process of defining the site's geographic bounds is ongoing. Information related to the history of handling and disposal of hazardous substances is being sought from local industries. Review of this information may lead to the identification of additional areas of concern which may require some degree of remedial action, ranging from gathering additional site data to implementing remedies.

The key components of a remedial program for an NPL site are essentially the same as for state-listed hazardous waste sites and include:

1. **Remedial Investigation.** Gather information and data to determine the nature and extent of contamination. Conduct an assessment of the risk to human health and the environment posed by the site.

2. **Feasibility Study.** Identify and evaluate remedial alternatives to adequately mitigate any threats to human health and the environment posed by the site.

3. **Remedy Selection.** NYSDEC will propose the site's remedy to the public and upon consideration of public comment will select the remedy and issue a Record of Decision.

4. **Remedy Design.** This process culminates with the preparation of detailed design documents suitable for purposes of construction.

5. **Remedy Construction.** All components of the remedy are constructed or otherwise implemented.

A basic element of managing the Onondaga Lake remedial program is to divide the site into manageable portions which can be addressed on a focused basis by virtue of their physical nature (e.g., geographic separation, specific contaminants, specific responsible parties, etc.) In general, these areas will be referred to as "subsites." This approach will enable discrete remedies to move forward independently rather than having to wait for complete NPL site remedies to be determined.

One of the major NPL subsites is the lake bottom, which is the focus of an ongoing RI/FS. This remedial work is being conducted by AlliedSignal pursuant to a Consent Decree executed with NYSDEC and approved by the U.S. District Court for the Northern District of New York. This RI/FS effort will likely be the basis for selecting an appropriate remedy(s) for a significant majority of the contaminated lake bottom sediments. A project schedule for the lake bottom RI/FS work is presented in Table 1-13.

The work plan developed for the AlliedSignal consent decree requires the development of mercury and calcite models which would simulate past, present, and future conditions of the lake under various remedial actions. It also includes a sampling program of water and sediments in the lake and tributaries to determine the variety of substances in the lake and the extent and distribution of Allied-related substances; a fish sampling program; an ecological effects study; and a human health and ecological risk assessment. The initial sampling round is complete and the NYSDEC is currently evaluating the mercury and calcite models.

Another key element to the RI/FS program is the implementation of interim remedial measures (IRMs) at appropriate subsites which enable remedial actions to move forward prior to final remedy selection. These are routine components of NYSDEC's hazardous waste remediation program, and the USEPA Superfund program has similar mechanisms. NYSDEC anticipates using IRMs to eliminate or reduce active releases or sources of hazardous substances to the Onondaga Lake system. IRMS become particularly beneficial when addressing a site like Onondaga Lake, which has complex residual contamination problems requiring extensive data gathering and sophisticated analyses to determine the appropriate remedy.

The NPL site remedial program will also include a citizen participation component for which a plan is being developed. The citizen participation plan will identify the various means by which the public can be involved in the remedial process via progress updates, informational meetings, and formal public meetings.

1.4 PAST STUDIES AND REPORTS

There have been at least 100 past studies, reports, or plans that relate to the METRO plant. These studies relate to METRO improvements, METRO alternatives, the water quality of Onondaga Lake or Seneca River, the expansion of METRO in 1975, METRO SPDES permit process and evaluation, volatile compound studies, industrial pretreatment, combined sewer overflows, pump station/service area improvements, infiltration and inflow, and odor control. A descriptive summary of these various efforts is presented in Appendix A.

TABLE 1-1

ORIGINAL METRO BASIS OF DESIGN-INFLUENT SEWAGE FLOWS[1,2]
Municipal Compliance Plan
Onondaga County, New York

	PROJECTED WASTEWATER FLOW RATE, MGD			
	MINIMUM DAILY	AVERAGE DAILY	PEAK DRY WEATHER	PEAK WET WEATHER
Main Interceptor Sewer (MIS)	16	32	50	120
Harbor Brook Interceptor Sewer (HBIS)	5	11	22	30
Westside Pump Station	5	12	18	28
Liverpool Pump Station	2	3	5	5
Ley Creek Pump Station[3]	8	19	25	40
TOTAL	**36**	**77** (Rounded to 80)	**120**	**223**

(1) Source: O'Brien & Gere Engineers, Inc. "Addendum No. 2 to Wastewater Facilities Report - Metropolitan Sewage Treatment Plant Expansion," December 1, 1972.

(2) Parallel preliminary wastewater treatment facilities are provided. Sewage flows from the MIS and HBIS are influent to the "new" screenings and grit building. Flows from Ley Creek, Liverpool, and Westside Pump Stations are influent to the "old" screenings and grit building.

(3) Pretreated effluent from the Ley Creek STP.

TABLE 1-2

ORIGINAL METRO BASIS OF DESIGN - EFFLUENT LIMITATIONS[1,2]
Municipal Compliance Plan
Onondaga County, New York

PARAMETER	TYPE OF LIMIT	LIMIT
Flow	Maximum 30-day arithmetic mean	86.5 mgd
BOD_5	Maximum 30-day arithmetic mean[3]	14 mg/l 10,100 lb/day
BOD_5	Maximum 7-day arithmetic mean	21 mg/l 15,150 lb/day
Suspended solids	Maximum 30-day arithmetic mean[3]	30 mg/l 21,642 lb/day
Suspended solids	Maximum 7-day arithmetic mean	45 mg/l 32,463 lb/day
Effluent disinfection	Time period required	April 1- October 15
Fecal coliform	Maximum 30-day geometric mean	200/100 ml
Fecal coliform	Maximum 7-day geometric mean	400/100 ml
Fecal coliform	Maximum 6-hour geometric mean	800/100 ml
Fecal coliform	Maximum individual sample	2400/100 ml
Chlorine residual (contact tank)	Range	0.5 - 2.0 mg/l
Chlorine residual (effluent)	Maximum	0.5 mg/l
pH	Range	6.0 - 9.0
Settleable solids	Daily maximum	0.3 ml/l
Phosphorus	Maximum 30-day arithmetic mean	1.0 mg/l as P

(1) Limits apply to main plant discharge which must be used for flows up to 120 mgd.
(2) Source: SPDES discharge permit effective 8/1/81 to 8/1/86.
(3) In addition to numerical limits, effluent values shall not exceed 15 percent of influent values.

TABLE 1-3

BASIS OF DESIGN
EXISTING METRO SYRACUSE SEWAGE TREATMENT PLANT[1]
Municipal Compliance Plan
Onondaga County, New York

General	
Design population	343,605
Design period	30 years (1970-2000)
Influent Sewage Flows and Characteristics	
Sewage flows	
Average flow (mgd)	80
Minimum flow (mgd)	36
Maximum dry weather flow (mgd)	120
Maximum wet weather flow (mgd)	223
Design sewage characteristics	
BOD (5-day)	220 mg/l; 133,000 lbs/day
Suspended solids	180 mg/l; 120,000 lbs/day
Raw Sewage Screening and Grit Removal	
Mechanical trash racks	
Number of units	2
Width of channel	6 feet
Clear bar spacing	4-inch
Velocity through screen	1.2 to 7.1 fps
Aerated grit chambers (new)	
Number of channels	2 in parallel
Capacity	75 mgd, each channel
Hydraulic capacity	150 mgd
Detention time at maximum flow (120 mgd)	2.3 minutes roughing chamber and distribution box; 5.1 minutes grit separation chamber
Minimum size	0.20 m.m.
Grit removal	Clamshell buckets
Grit dewatering	Bucket draining
Grit handling	Dump truck
Grit disposal	Sanitary landfill
Aerated grit chambers (old)	
Number of channels	3
Capacity	73 mgd total
Detention time at maximum flow (120 mgd)	2.2 minutes
Minimum size	0.20 m.m.
Grit removal	Bucket elevator
Grit handling	Screw conveyor and dump truck
Grit disposal	Sanitary landfill
Mechanical bar screens	
Number of screens	2
Width of channel	6 feet
Clear bar spacing	3/4 inch
Velocity through screens	.9 to 3.1 fps
Velocity control	Channel configuration and wet well level

TABLE 1-3 (continued):

Raw Sewage Pumping Station	
Wet well	
Detention time at average flow (80 mgd)	1 minute
Raw sewage pumps	
Number of pumps	5 (4 operating, 1 spare)
Type of pumps	Mixed flow centrifugals
Design peak flow	223 mgd
Pump drives	Variable speed - 600 HP wet well level controlled
Raw sewage force main	
Diameter	90 inches
Length	820 feet
Velocity at average flow (80 mgd)	2.2 fps
Flow metering	
Type of meter	Venturi meter
Data transmittal	Telemetering
Primary Clarifiers	
Number of units	8
Dimensions	
Diameter	135 feet
Sidewater depth	10 feet
Surface settling rate	
At average flow (80 mgd)	740 gpd/SF
At peak flow (120 mgd)	1,050 gpd/SF
Weir overflow rate	
At average flow (80 mgd)	14,200 gpd/ft
At peak flow (120 mgd)	21,000 gpd/ft
Detention time	
At average flow (80 mgd)	2.4 hours
At peak flow (120 mgd)	1.6 hours
Peak Wet Weather Flow Chlorination (Bypass Chlorine Contact Tanks)	
Chlorine contact tanks	
Number	2
Dimensions	31 feet x 100 feet x 20 feet deep
Detention time at peak flow (120 mgd)	13 minutes
Chlorine feed equipment	
Number of feeders	2
Dosage at peak flow	15 mg/l
Capacity (each feeder)	8,000 lbs/day
Gravity sewer - chlorine contact tank to lake	
Number	1
Length	2,250 feet
Size	60 inches and 72 inches
Velocity	8.2 and 5.6 fps
Detention time in line to shore at 100 mgd	2 minutes

TABLE 1-3 (continued):

Aeration Tanks	
Number of tanks	8
Dimensions	100 feet x 130 feet x 14.2 feet deep
Hydraulic detention time at average flow (80 mgd)	3.16 hours
MLSS	3,000 ppm
Average recycle rate	50% flow
Mechanical aerators	
Number	48
Size	100 HP
Oxygen requirements	
Contact stabilization mode	80,700
Activated sludge mode	72,400
Dissolved oxygen level	2 ppm
Return activated pumps	
Number	6 (4 operating, 2 spare)
Type	Centrifugal-mixed flow
Return sludge rate	33-100% flow
Secondary Clarifiers	
Number	4
Dimensions	170 feet x 170 feet x 11 feet deep
Surface settling rate	
At average flow (80 mgd)	690 gpd/SF
At maximum flow (120 mgd)	1,030 gpd/SF
Weir overflow rate	
At average flow (80 mgd)	16,500 gpd/ft
At peak flow (120 mgd)	24,700 gpd/ft
Accessories	Rapid sludge return surface scum removal
Secondary Effluent Chlorination	
Chlorine contact tanks	
Number	4
Size	170 feet x 19.5 feet x 11 feet deep
Detention time at peak flow (120 mgd)	13.0 minutes
Chlorine feed equipment	
Number of feeders	2
Dosage	6 mg/l
Capacity	8,000 lb/day
Type of feeder	Vacuum solution feed
Gravity sewer - secondary chlorination to tertiary pump station	
Number	1
Length	1,000 feet
Size	84-inch diameter
Velocity (at 120 mgd)	4.8 fps
Detention time in line	3.5 minutes

TABLE 1-3 (continued):

Tertiary Pump Station	
Wet well	
Detention time	
Average flow (80 mgd)	3.1 minutes
Maximum flow (120 mgd)	2 minutes
Tertiary feed pumps	
Number	3
Type	Propeller
Design peak flow	120 mgd
Pump drives	300 HP, variable speed, wet well level controlled
Pump discharge header	
Size	72-inch diameter
Velocity	
Average flow	80 mgd = 4.4 fps
Maximum flow	120 mgd = 6.6 fps
Inlet headers to tertiary distribution boxes	
Number	2
Size	48-inch diameter
Velocity	
Average flow	43.2 mgd = 5.3 fps
Maximum flow	67.1 mgd = 8.4 fps
Tertiary Treatment Units	
Flash mixing chambers	
Number	2
Volume	1,200 ft^3 each
Detention time	
At average flow	43.2 mgd = 18 seconds
At maximum flow	67.1 mgd = 12 seconds
Distribution pipes to clarifiers	
Number	6
Size	30-inch
Velocity	
At average flow	14.4 mgd = 4.6 fps
At maximum flow	22.4 mgd = 7.1 fps
Tertiary clarifiers	
Number	6
Type	Clariflocculators
Size	112 feet diameter x 10 feet deep
Detention time in settling zone	
At average flow (80 mgd)	70 minutes
At maximum flow (120 mgd)	45 minutes
Surface settling rate without tube settlers	
At average flow (80 mgd)	1,560 gpd/ft^2
At maximum flow (120 mgd)	2,400 gpd/ft^2
Effective settling rate with tube settlers	
At average flow (80 mgd)	930 gpd/ft^2
At maximum flow (120 mgd)	1,440 gpd/ft^2

TABLE 1-3 (continued):

Tertiary Treatment Units (continued)	
Weir overflow rate	
At average flow (80 mgd)	22,400 gpd/ft
At maximum flow (120 mgd)	32,000 gpd/ft
Primary Sludge Pumping	
Primary sludge pumps	
Number	16 (8 operating)
Type	Progressive cavity variable speed, continuous operation
Capacity	100 gpm each
Primary pump suction pipes	
Number	8
Size	6-inch diameter
Velocity	.63 fps at 55.2 gpm
Primary pump discharge headers	
Size	4-inch
Number	8 lines
Velocity	1.41 fps at 55.2 gpm
Primary sludge lines	
Size	6-inch
Velocity at average flow (80 mgd)	2.50 fps
Waste Activated Sludge Pumping	
Waste activated sludge pumps	
Number	6 (4 operating, 2 spares)
Type	Centrifugal slurry pumps with throttling valves
Capacity	1.2 mgd each pump
Suction pipes	
Size	8-inch diameter
Velocity at average flow (80 mgd)	3.4 fps
Discharge pipes to thickeners	
Size	10-inch diameter
Velocity at average flow (80 mgd)	4.4 fps
Gravity Sludge Thickening	
Thickener tanks	
Average flow	5.76 mgd
Type	Gravity
Number	3
Dimensions	65 feet diameter x 12 feet sidewater depth
Solids loading	18.9 lbs/solids/day/ft^2
Surface settling rate at average flow (80 mgd)	560 gpd/ft^2
Weir overflow rate at average flow (80 mgd)	9,200 gpd/ft^2

TABLE 1-3 (continued):

Gravity Sludge Thickening (continued)	
Overflow piping to raw sewage wet well	
Size	18-inch pipe
Average flow	5.4 mgd
Velocity	4.7 fps at average flow
Thickened sludge pumps	
Number	6 (3 operating, 3 spares)
Type	Progressive cavity
Average flow	123,000 gpd each
Capacity	185,000 gpd each
Thickener pump suction lines	
Number	(6), 10 feet long interconnected
Size	6-inch diameter
Average flow	123,000 gpd
Velocity at average flow	0.98 ft/sec
Thickener pump discharge line	
Number	(3) 500 feet long with interconnections
Size	4-inch diameter
Average flow	123,000 gpd
Velocity at average flow	2.1 fps
Anaerobic Sludge Digestion	
Primary digesters	
Type	High rate
Number	3
Mixing	Gas dispersion
Size	100 foot diameter x 27.5 feet SWD
Volume	239,000 CF/digester; 715,000 CF total
Detention time	14.5 days
Total solids loading	.26 lbs/day/CF
Volatile solids loading	.13 lbs/day/CF
Heating	90-95°F by external heat exchangers
Secondary digester	
Number	1
Type	Unmixed and unheated
Size	100 foot diameter x 24.5 SWD
Volume	219,000 CF
Detention time	4.4 days
Digested sludge pumping	
Sludge recirculation pumps	
Number	3
Type	Non-clog, centrifugal
Capacity	700 gpm
Recycle digested sludge pump	
Number	1
Type	Positive displacement, variable speed, continuous
Capacity	50 gpm

TABLE 1-3 (continued):

Anaerobic Sludge Digestion (continued)	
Waste digested sludge pump	
Number	1
Type	Positive displacement, variable speed, continuous operation
Capacity	200 gpm
Existing triplex pump	
Number	1
Type	Positive displacement, plunger type
Use	Spare for pump
Average flow	110 gpm
Capacity	175 gpm
Tertiary Sludge Pumps	
Number	8 (2 spares)
Type	Progressive cavity
Capacity	275 gpm each
Sludge Disposal Pumping Station	
Wet well	
Volume	560 CF
Detention time at average flow (80 mgd)	3 minutes
Sludge disposal pumps	
Number	2 (1 operating, 1 spare)
Type	Centrifugal slurry pumps, variable speed, continuous operation
Average flow	1.17 mgd
Capacity	2.12 mgd
Sludge disposal force main to Allied Chemical Co.	
Size	12-inch diameter
Length	12,000 feet
Velocity at average flow	2.30 fps
Velocity at maximum flow	4.15 fps
Emergency Centrifuges	
Centrifuge feed pumps	
Number	2
Type	Positive displacement, variable speed
Capacity	175 gpm
Centrifuges	
Number	2
Type	Continuous solid bowl
Solids loading	4,500 lbs/hour each
Cake handling	Dump truck
Supernatant handling	Drains to gravity thickeners

TABLE 1-3 (continued):

Allied Chemical Company Holding Pond	
Type	Earthen construction, two sections
Average water surface	
Section No. 1	3 acres
Section No. 2	15 acres
Depth	9 feet
Detention time	3 days at 10.5 mgd
Berm width	20 feet minimum
Freeboard	Variable with 3 feet minimum
Allied Chemical Company Pumping Station	
Wet well	
Volume	18,000 gallons
Detention time at average flow	2.5 minutes
Allied waste pumps	
Number	2 (1 operating, 1 spare)
Type	Centrifugal, variable speed, continuous
Capacity	14 mgd
Pump control	Pond level with remote on-off at METRO plant
Flow measurement	Telemetered at METRO plant
Allied Chemical Company Force Main	
Diameter	24-inch
Length	18,000 feet
Average flow	10.5 mgd
Velocity	5.17 fps at 10.5 mgd

(1) Source: O'Brien & Gere Engineers, Inc., "Addendum No. 2 to Wastewater Facilities Report - Metropolitan Sewage Treatment Plant Expansion," December 1, 1972.

TABLE 1-4

ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION
ONONDAGA CREEK SEWER OVERFLOW SUMMARY
Municipal Compliance Plan
Onondaga County, New York

CSO NUMBER	80% STORM PEAK RATE (CFS)	90% STORM PEAK RATE (CFS)	1-YEAR STORM PEAK RATE (CFS)	2-YEAR STORM PEAK RATE (CFS)	5-YEAR STORM PEAK RATE (CFS)	10-YEAR STORM PEAK RATE (CFS)
020	6	39	72	93	93	93
021	54	172	219	236	252	264
022	86	131	200	233	234	234
027	0	1	11	16	25	30
028	0	54	80	92	98	98
029	1	4	9	13	19	19
029	4	7	12	16	20	22
030	39	104	208	263	364	421
031	1	6	14	18	25	29
032	3	8	16	21	29	30
033	3	5	9	12	16	19
034	49	141	281	332	333	333
035	2	8	18	21	22	22
036	27	48	55	56	56	56
037	4	15	22	22	23	23
039	57	135	206	206	206	206
042	43	93	160	160	160	160
043	58	130	208	222	241	251
044	13	33	65	79	88	88
048	2	6	12	14	15	15
050	2	10	16	17	17	17
051	0	5	14	15	16	16
052	21	47	90	108	114	114
053	0	2	8	10	11	11
054	0	1	6	8	9	9
060	20	86	192	202	208	212
062	2	5	8	10	10	10
065	1	4	8	10	13	15
066	31	71	136	136	136	136
067	5	12	26	33	44	47
073	5	1	136	146	157	150
075	8	28	28	28	28	28
076	0	3	39	44	58	68
077	26	81	175	181	181	181
080	68	171	365	429	451	435
TOTAL	638	1,666	3,123	3,500	3,767	3,860

Notes: The 80 percent storm and 90 percent storm are precipitation events whose total rainfall is statistically exceeded by 20 percent and 10 percent of the events in a typical year.

The 1, 2, 5, and 10-year storm events are events whose rainfall intensity will be equaled or exceeded every 1, 2, 5, and 10 years, respectively.

TABLE 1-5

ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION
HARBOR BROOK SEWER OVERFLOW SUMMARY
Municipal Compliance Plan
Onondaga County, New York

CSO NUMBER	80% STORM PEAK RATE (CFS)	90% STORM PEAK RATE (CFS)	1-YEAR STORM PEAK RATE (CFS)	2-YEAR STORM PEAK RATE (CFS)	5-YEAR STORM PEAK RATE (CFS)	10-YEAR STORM PEAK RATE (CFS)
063	31	67	79	79	79	79
003	21	52	94	110	145	172
004	56	90	90	90	90	90
005	3	9	13	13	13	13
006	0	6	10	11	12	12
007	0	5	12	17	17	17
008	1	4	5	5	5	5
009	4	11	14	16	17	19
010	6	11	12	12	12	12
011	0	12	15	15	15	15
013	0	0	2	2	4	6
014	33	83	154	189	189	189
015	8	20	23	23	23	23
016	1	7	12	14	14	15
017	5	14	24	28	28	28
018	31	63	64	64	64	64
078	24	55	68	80	122	116
006a	1	8	9	9	9	9
TOTAL	224	516	698	775	858	883

TABLE 1-6

IMPLEMENTED BEST MANAGEMENT PRACTICES (BMP)
FOR COMBINED SEWER OVERFLOWS
Municipal Compliance Plan
Onondaga County, New York

OVERFLOW WEIR AND DAM MODIFICATIONS			
NUMBER OF STRUCTURES	TYPE OF DIVERSION	RECOMMENDED MODIFICATION	NUMBER OF STRUCTURES NODIFIED
7	Stop planks	None	0
5	Sluice gates	None	0
2	Slab and wall	Replace with dam	1
4	Orifice	Increase dam elevation	2
12	Dam and orifice	Increase dam elevation	9
31	Leaping weir	Increase dam elevation	26
25	Side overflow weir	Increase dam elevation	20
24	Difference in elevation	Increase weir elevation	5
4	Abandoned or sealed	None	0
0	Flap gates	Install flap gates	8

INCREASING OF REGULATOR CAPACITIES			
OVERFLOW NUMBER	REGULATOR LOCATION	RECOMMENDED MODIFICATIONS PIPE SIZE INCREASE, INCHES	LENGTH, FEET
009	West Fayette Street (west of Harbor Brook)	8 to 12	10
010	West Fayette Street (east of Harbor Brook)	8 to 12	113
015	Herriman Street and Grand Avenue	8 to 18	15
016	Lydell Street between Grand Avenue and Hartson	8 to 12	6
022	Wallace Street and West Genesee Street	8 to 18	39
024	Water Street and Franklin Street	8 to 12	12
029	Walter Street (east of Onondaga Creek)	6 to 10	12
036	West Onondaga Street	18 to 24	214
037	Adams and Oneida Street	8 to 12	27

TABLE 1-6 (continued):

CONVEYANCE SYSTEM CLEANING PROGRAM		
CONDUIT	**STRETCH TO BE CLEANED**	**LENGTH, FEET**
Main Interceptor	From Midland and Blain to METRO	15,700
Lower Harbor Brook Interceptor	From Erie Boulevard to Hiawatha Boulevard	4,400
Emerson Avenue Interceptor	From Emerson Avenue to Erie Boulevard and Harbor	2,800
Bellevue Avenue Regulator	Along Bellevue Avenue	790
Upper Harbor Brook Interceptor	Holden Street to Delaware Street	2,600
TOTAL LENGTH		26,290

SEWER REHABILITATION AND REPLACEMENT		
CONDUIT	**RECOMMENDED IMPROVEMENT**	**LENGTH, FEET**
Harbor Brook Interceptor	30/42-inch replacement from Erie Boulevard (MH-15) to existing MH-1	3,408
Harbor Brook Interceptor	New 15-inch sewer to pick up laterals. MH-18 to existing pumping station in Richmond	667

IN-SYSTEM STORAGE		
LOCATION	**RECOMMENDED IMPROVEMENT**	**TOTAL CAPACITY, MG**
Erie Boulevard storm sewer	Installation of control gates	5.0

IN-SYSTEM GRIT FACILITIES			
LOCATION	**APPROXIMATE OUTSIDE DIMENSIONS, FEET**		
	WIDTH	**DEPTH**	**LENGTH**
Tremont Street	25	20	49
Rowland Street (modify existing)	7	10	13
Delaware Street	11	14	19
Liberty Street	20	12	39
State Fair Boulevard	20	13	48
Emerson Avenue (modify existing)	8	15	10

TABLE 1-7

MONTHLY AVERAGE METRO EFFLUENT BOD5 DATA - OUTFALL 001
Municipal Compliance Plan
Onondaga County, New York

	Sewage Flow, mgd								
Month	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	73.3	72.9	74.2	74.5	82.3	65.9	56.5	63.1	63.9
Feb	69.8	77.1	77.9	97.9	85.8	70.9	52.1	71.6	59.9
Mar	80.9	77.0	78.5	87.1	90.1	77.8	52.1	96.5	71.7
Apr	81.4	69.9	86.3	93.1	80.2	84.8	57.7	102.6	65.0
May	60.9	76.5	88.7	89.5	69.7	71.2	57.6	75.4	
Jun	61.3	67.0	80.7	70.1	58.2	66.6	56.7	64.1	
Jul	60.9	66.6	60.8	64.1	48.4	74.8	54.6	63.2	
Aug	58.9	66.4	56.0	59.7	57.6	64.2	55.6	56.7	
Sep	67.4	63.2	62.4	61.2	57.2	63.9	54.4	57.8	
Oct	66.4	66.6	66.4	74.4	56.8	59.7	55.6	55.7	
Nov	70.2	72.0	71.6	78.1	57.8	58.1	64.6	60.2	
Dec	76.0	65.1	62.8	85.9	67.0	56.5	64.5	66.5	
Average	68.9	70.0	72.1	77.8	67.5	67.9	56.9	69.4	

	BOD5 Concentration, mg/l								
Month	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	22.7	21.0	19.8	14.5	17.7	18.1	22.1	20.6	16.9
Feb	18.8	21.9	17.9	13.0	16.0	16.7	47.8	33.3	14.9
Mar	18.1	17.4	16.7	12.3	14.2	17.9	38.4	26.9	15.7
Apr	18.8	16.4	12.9	12.2	16.8	21.6	14.2	16.7	19.7
May	19.0	20.1	13.6	12.1	14.7	19.0	18.1	20.2	
Jun	16.5	18.8	16.1	14.1	17.3	16.9	17.9	20.4	
Jul	12.3	22.2	12.7	14.3	14.9	17.8	21.5	14.7	
Aug	19.5	16.9	13.0	15.2	15.3	13.4	13.7	19.0	
Sep	17.3	14.8	12.1	15.0	16.2	18.0	16.2	14.8	
Oct	20.2	20.0	15.0	14.2	17.2	18.2	19.1	19.5	
Nov	20.4	16.7	22.7	19.7	19.9	15.7	21.9	15.7	
Dec	20.2	20.1	25.4	15.9	21.5	22.1	17.9	16.1	
Average	18.7	18.9	16.5	14.3	16.8	18.0	21.9	20.1	

	BOD5 Loading, lbs/day								
Month	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	13,872	12,783	12,273	9,038	12,174	9,943	10,433	10,812	8,998
Feb	10,939	14,057	11,603	10,581	11,433	9,861	20,774	19,865	7,431
Mar	12,220	11,204	10,964	8,931	10,689	11,634	16,692	21,648	9,356
Apr	12,744	9,534	9,262	9,460	11,240	15,288	6,816	14,325	10,691
May	9,654	12,804	10,070	9,010	8,527	11,288	8,697	12,730	
Jun	8,433	10,497	10,858	8,272	8,408	9,363	8,442	10,881	
Jul	6,247	12,337	6,454	7,647	6,006	11,136	9,766	7,748	
Aug	9,599	9,340	6,082	7,543	7,333	7,164	6,363	8,989	
Sep	9,730	7,787	6,281	7,660	7,749	9,615	7,338	7,142	
Oct	11,190	11,095	8,329	8,804	8,154	9,070	8,857	9,067	
Nov	11,943	10,043	13,520	12,847	9,587	7,605	11,810	7,858	
Dec	12,776	10,914	13,294	11,372	12,023	10,406	9,628	8,957	
Average	10,778	11,033	9,901	9,250	9,429	10,197	10,404	11,619	

TABLE 1-8

MONTHLY AVERAGE METRO EFFLUENT TSS DATA - OUTFALL 001
Municipal Compliance Plan
Onondaga County, New York

	Sewage Flow, mgd								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	73.3	72.9	74.2	74.5	82.3	65.9	56.5	63.1	63.9
Feb	69.8	77.1	77.9	97.9	85.8	70.9	52.1	71.6	59.9
Mar	80.9	77.0	78.5	87.1	90.1	77.8	52.1	96.5	71.7
Apr	81.4	69.9	86.3	93.1	80.2	84.8	57.7	102.6	65.0
May	60.9	76.5	88.7	89.5	69.7	71.2	57.6	75.4	
Jun	61.3	67.0	80.7	70.1	58.2	66.6	56.7	64.1	
Jul	60.9	66.6	60.8	64.1	48.4	74.8	54.6	63.2	
Aug	58.9	66.4	56.0	59.7	57.6	64.2	55.6	56.7	
Sep	67.4	63.2	62.4	61.2	57.2	63.9	54.4	57.8	
Oct	66.4	66.6	66.4	74.4	56.8	59.7	55.6	55.7	
Nov	70.2	72.0	71.6	78.1	57.8	58.1	64.6	60.2	
Dec	76.0	65.1	62.8	85.9	67.0	56.5	64.5	66.5	
Average	68.9	70.0	72.1	77.8	67.5	67.9	56.9	69.4	

	TSS Concentration, mg/l								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	14.3	12.1	13.2	13.1	12.9	13.6	15.8	10.2	8.1
Feb	12.4	13.2	13.8	16.3	13.9	10.0	34.6	31.5	8.0
Mar	10.9	10.8	13.7	13.6	13.6	13.9	31.0	25.2	10.1
Apr	8.9	10.5	15.3	14.9	13.1	15.8	12.7	14.4	12.1
May	5.5	9.0	12.4	10.8	9.2	12.0	12.8	10.8	
Jun	6.5	10.1	11.7	8.2	5.7	9.0	11.4	6.8	
Jul	6.1	10.7	9.4	7.1	5.1	6.9	11.1	6.6	
Aug	6.5	9.9	7.6	11.6	7.4	6.0	7.2	9.8	
Sep	8.3	8.4	8.5	11.9	6.8	9.8	7.1	6.5	
Oct	7.9	12.7	10.7	9.4	7.2	8.0	7.5	7.9	
Nov	11.9	10.7	10.0	10.6	7.1	9.6	6.2	5.7	
Dec	11.3	11.2	17.6	12.7	11.1	13.4	7.2	8.6	
Average	9.4	10.8	12.2	11.9	10.0	10.8	13.2	12.8	

	TSS Loading, lbs/day								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	8,752	7,357	8,183	8,123	8,861	7,475	7,421	5,388	4,325
Feb	7,236	8,465	8,948	13,275	9,957	5,936	15,029	18,803	4,019
Mar	7,368	6,927	8,975	9,881	10,198	9,035	13,458	20,317	6,009
Apr	6,011	6,150	10,991	11,601	8,742	11,183	6,104	12,312	6,566
May	2,775	5,716	9,154	8,085	5,369	7,134	6,173	6,817	
Jun	3,313	5,634	7,880	4,798	2,785	5,008	5,399	3,623	
Jul	3,087	5,924	4,768	3,784	2,072	4,319	5,053	3,474	
Aug	3,196	5,470	3,549	5,751	3,549	3,215	3,335	4,618	
Sep	4,667	4,453	4,414	6,084	3,265	5,237	3,209	3,135	
Oct	4,392	7,066	5,918	5,839	3,396	4,004	3,469	3,663	
Nov	6,950	6,419	5,990	6,925	3,444	4,647	3,342	2,862	
Dec	7,183	6,086	9,227	9,089	6,218	6,321	3,894	4,792	
Average	5,398	6,301	7,320	7,729	5,631	6,123	6,272	7,413	

TABLE 1-9

MONTHLY AVERAGE METRO EFFLUENT PHOSPHORUS DATA - OUTFALL 001
Municipal Compliance Plan
Onondaga County, New York

	Sewage Flow, mgd								
Month	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Jan	73.3	72.9	74.2	74.5	82.3	65.9	56.5	63.1	63.9
Feb	69.8	77.1	77.9	97.9	85.8	70.9	52.1	71.6	59.9
Mar	80.9	77.0	78.5	87.1	90.1	77.8	52.1	96.5	71.7
Apr	81.4	69.9	86.3	93.1	80.2	84.8	57.7	102.6	65.0
May	60.9	76.5	88.7	89.5	69.7	71.2	57.6	75.4	
Jun	61.3	67.0	80.7	70.1	58.2	66.6	56.7	64.1	
Jul	60.9	66.6	60.8	64.1	48.4	74.8	54.6	63.2	
Aug	58.9	66.4	56.0	59.7	57.6	64.2	55.6	56.7	
Sep	67.4	63.2	62.4	61.2	57.2	63.9	54.4	57.8	
Oct	66.4	66.6	66.4	74.4	56.8	59.7	55.6	55.7	
Nov	70.2	72.0	71.6	78.1	57.8	58.1	64.6	60.2	
Dec	76.0	65.1	62.8	85.9	67.0	56.5	64.5	66.5	
Average	68.9	70.0	72.1	77.8	67.5	67.9	56.9	69.4	

	Total Phosphorus Concentration, mg/l								
Month	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Jan	0.85	0.83	0.56	0.66	0.98	0.42	0.86	0.76	0.73
Feb	0.97	0.70	0.55	0.51	0.72	0.66	1.09	0.85	0.50
Mar	0.91	0.64	0.51	0.69	0.54	0.64	1.08	0.84	0.66
Apr	0.83	0.89	0.46	0.76	0.67	0.70	0.50	0.40	0.40
May	1.14	0.84	0.66	0.40	0.16	0.59	0.39	0.78	
Jun	1.14	1.22	0.68	0.67	0.42	0.63	0.68	0.29	
Jul	1.11	0.84	0.63	0.42	0.58	0.28	0.52	0.45	
Aug	1.28	0.73	0.55	0.72	0.58	0.30	0.39	0.45	
Sep	1.31	0.76	0.51	0.73	0.49	0.60	0.78	0.56	
Oct	1.19	0.71	0.51	0.25	0.57	0.46	0.63	0.85	
Nov	0.92	0.60	0.88	0.41	0.38	0.77	0.56	0.26	
Dec	0.77	0.64	0.58	0.43	0.48	0.51	0.31	0.49	
Average	1.02	0.78	0.59	0.55	0.56	0.55	0.63	0.59	

	Total Phosphorus Loading, lbs/day								
Month	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Jan	522	503	344	411	676	233	407	401	390
Feb	565	449	358	416	516	389	475	508	249
Mar	611	414	333	500	404	416	468	676	395
Apr	566	521	329	589	447	496	242	345	218
May	580	534	487	301	96	350	188	489	
Jun	581	680	456	391	205	352	319	154	
Jul	564	469	318	227	234	178	237	238	
Aug	630	407	256	358	278	162	179	214	
Sep	738	402	265	373	232	322	353	268	
Oct	657	394	285	153	268	228	291	395	
Nov	538	360	526	267	185	372	302	129	
Dec	490	349	302	310	267	239	168	272	
Average	587	456	354	357	316	310	301	341	

TABLE 1-10

MONTHLY AVERAGE METRO EFFLUENT TKN DATA - OUTFALL 001
Municipal Compliance Plan
Onondaga County, New York

	Sewage Flow, mgd								
	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	73.3	72.9	74.2	74.5	82.3	65.9	56.5	63.1	63.9
Feb	69.8	77.1	77.9	97.9	85.8	70.9	52.1	71.6	59.9
Mar	80.9	77.0	78.5	87.1	90.1	77.8	52.1	96.5	71.7
Apr	81.4	69.9	86.3	93.1	80.2	84.8	57.7	102.6	65.0
May	60.9	76.5	88.7	89.5	69.7	71.2	57.6	75.4	
Jun	61.3	67.0	80.7	70.1	58.2	66.6	56.7	64.1	
Jul	60.9	66.6	60.8	64.1	48.4	74.8	54.6	63.2	
Aug	58.9	66.4	56.0	59.7	57.6	64.2	55.6	56.7	
Sep	67.4	63.2	62.4	61.2	57.2	63.9	54.4	57.8	
Oct	66.4	66.6	66.4	74.4	56.8	59.7	55.6	55.7	
Nov	70.2	72.0	71.6	78.1	57.8	58.1	64.6	60.2	
Dec	76.0	65.1	62.8	85.9	67.0	56.5	64.5	66.5	
Average	68.9	70.0	72.1	77.8	67.5	67.9	56.9	69.4	

	TKN Concentration, mg/l								
Month	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	21.3	19.7	22.9	16.7	16.7	19.0	17.0	21.6	23.5
Feb	22.0	19.3	21.2	14.8	19.1	19.1	20.8	20.2	22.0
Mar	19.0	20.9	23.9	16.4	17.1	17.9	18.2	14.0	19.2
Apr	16.3	17.1	21.0	15.0	17.1	15.9	9.9	12.4	22.2
May	22.1	20.9	19.0	16.3	19.3	19.0	14.7	19.8	
Jun	19.6	23.9	17.0	16.4	23.0	19.4	17.9	22.6	
Jul	10.8	19.2	7.5	10.7	10.4	14.1	16.8	7.8	
Aug	14.4	7.8	4.1	14.3	8.7	9.3	13.0	11.6	
Sep	13.7	7.8	4.7	11.4	10.5	14.5	15.4	14.2	
Oct	19.9	13.1	6.7	9.8	12.0	15.9	16.1	23.3	
Nov	19.3	18.0	11.6	11.6	21.1	17.2	16.4	20.4	
Dec	22.7	23.4	18.6	14.1	16.5	18.8	19.5	19.9	
Average	18.5	17.7	15.6	14.1	16.3	16.7	16.3	17.0	

	TKN Loading, lbs/day								
Month	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	13,017	12,002	14,133	10,355	11,468	10,433	7,989	11,337	12,515
Feb	12,815	12,391	13,767	12,113	13,689	11,287	9,022	12,050	11,005
Mar	12,805	13,413	15,652	11,882	12,855	11,641	7,902	11,307	11,473
Apr	11,064	9,946	15,096	11,668	11,427	11,229	4,748	10,573	12,034
May	11,231	13,307	14,081	12,182	11,215	11,300	7,043	12,447	
Jun	10,040	13,328	11,444	9,617	11,175	10,783	8,444	12,104	
Jul	5,510	10,670	3,787	5,698	4,194	8,805	7,636	4,092	
Aug	7,095	4,322	1,892	7,113	4,169	4,979	6,027	5,487	
Sep	7,699	4,125	2,461	5,806	5,017	7,728	7,008	6,841	
Oct	10,992	7,248	3,712	6,102	5,680	7,908	7,476	10,848	
Nov	11,265	10,809	6,950	7,566	10,147	8,310	8,839	10,222	
Dec	14,378	12,684	9,740	10,105	9,241	8,884	10,501	11,020	
Average	10,648	10,351	9,361	9,165	9,150	9,430	7,714	9,842	

TABLE 1-11

MONTHLY AVERAGE METRO EFFLUENT AMMONIA DATA - OUTFALL 001
Municipal Compliance Plan
Onondaga County, New York

	Sewage Flow, mgd								
Month	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	73.3	72.9	74.2	74.5	82.3	65.9	56.5	63.1	63.9
Feb	69.8	77.1	77.9	97.9	85.8	70.9	52.1	71.6	59.9
Mar	80.9	77.0	78.5	87.1	90.1	77.8	52.1	96.5	71.7
Apr	81.4	69.9	86.3	93.1	80.2	84.8	57.7	102.6	65.0
May	60.9	76.5	88.7	89.5	69.7	71.2	57.6	75.4	
Jun	61.3	67.0	80.7	70.1	58.2	66.6	56.7	64.1	
Jul	60.9	66.6	60.8	64.1	48.4	74.8	54.6	63.2	
Aug	58.9	66.4	56.0	59.7	57.6	64.2	55.6	56.7	
Sep	67.4	63.2	62.4	61.2	57.2	63.9	54.4	57.8	
Oct	66.4	66.6	66.4	74.4	56.8	59.7	55.6	55.7	
Nov	70.2	72.0	71.6	78.1	57.8	58.1	64.6	60.2	
Dec	76.0	65.1	62.8	85.9	67.0	56.5	64.5	66.5	
Average	68.9	70.0	72.1	77.8	67.5	67.9	56.9	69.4	

	Ammonia Concentration, mg/l as NH3								
Month	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	19.5	19.9	23.7	16.5	15.2	19.1	16.1	21.5	23.4
Feb	22.1	18.4	22.2	13.7	17.8	18.4	19.0	16.0	24.0
Mar	17.0	20.5	22.9	16.2	15.9	16.6	15.8	10.7	19.4
Apr	15.1	17.1	19.1	14.2	15.8	14.6	6.7	9.9	22.8
May	22.2	21.3	18.1	15.8	18.9	18.9	13.8	19.8	
Jun	21.4	25.5	15.9	16.1	22.5	19.2	17.7	23.5	
Jul	10.1	21.7	5.2	9.7	10.0	14.5	17.8	11.0	
Aug	13.9	6.7	1.9	13.9	8.4	8.0	12.5	11.0	
Sep	14.4	6.9	3.4	11.3	9.7	13.5	16.5	14.1	
Oct	20.6	14.4	5.0	8.6	12.2	15.0	16.8	25.8	
Nov	19.0	16.7	9.7	10.8	22.0	17.6	16.8	21.8	
Dec	18.7	21.7	19.8	13.1	17.3	18.6	19.2	20.4	
Average	17.8	17.7	14.7	13.5	15.7	16.1	15.7	16.6	

	Ammonia Loading, lbs/day as NH3								
Month	1987	1988	1989	1990	1991	1992	1993	1994	1995
Jan	11,893	12,083	14,630	10,286	10,403	10,512	7,579	11,304	12,492
Feb	12,830	11,839	14,443	11,185	12,714	10,870	8,242	9,565	11,977
Mar	11,466	13,155	15,007	11,728	11,920	10,767	6,844	8,635	11,567
Apr	10,227	9,973	13,760	11,029	10,590	10,340	3,239	8,451	12,355
May	11,296	13,577	13,381	11,820	10,964	11,219	6,653	12,447	
Jun	10,967	14,267	10,724	9,393	10,949	10,650	8,354	12,575	
Jul	5,145	12,087	2,646	5,184	4,037	9,061	8,095	5,819	
Aug	6,830	3,683	875	6,905	4,062	4,276	5,775	5,215	
Sep	8,127	3,654	1,771	5,744	4,638	7,206	7,479	6,814	
Oct	11,397	7,972	2,793	5,308	5,789	7,457	7,797	11,979	
Nov	11,142	10,017	5,818	7,017	10,610	8,537	9,071	10,927	
Dec	11,863	11,769	10,381	9,358	9,691	8,761	10,348	11,311	
Average	10,246	10,341	8,816	8,731	8,829	9,128	7,454	9,586	

TABLE 1-12

INACTIVE HAZARDOUS WASTE SITES LOCATED IN ONONDAGA LAKE WATERSHED
Municipal Compliance Plan
Onondaga County, New York

SITE NAME	CITY/TOWN/VILLAGE	CLASSIFICATION
AlliedSignal tar beds	Camillus/Geddes	2
Crucible Steel	Solvay	3
Maestri site	Geddes	2
AlliedSignal Willis Avenue	Solvay	2
Onondaga Lake sediments	Syracuse/Geddes/Salina	2
Syracuse Fire Training School	Syracuse	2
Val's Dodge	Solvay	2a
LCP Chemical	Solvay	2
McKesson Envirosystems	Syracuse	2
Clark property	Syracuse	4
Quanta Resources	Syracuse	2
Crouse-Hinds	Syracuse	3
Salina town landfill	Syracuse	2a
Ley Creek PCB Dredgings	Salina	2
Syracuse China	Syracuse	2
G.M/Fisher Guide	Dewitt	2
G.E. Farrel Road	Geddes	2
Bristol Labs	Dewitt	3
Tripoli landfill	Onondaga	4
Valenite	East Syracuse	2a
Onondaga Nation Site B	Onondaga	2
UTC/Carrier	Dewitt	2
Peter Winkleman Company	Syracuse	2
Brighton Avenue Landfill	Syracuse	2a

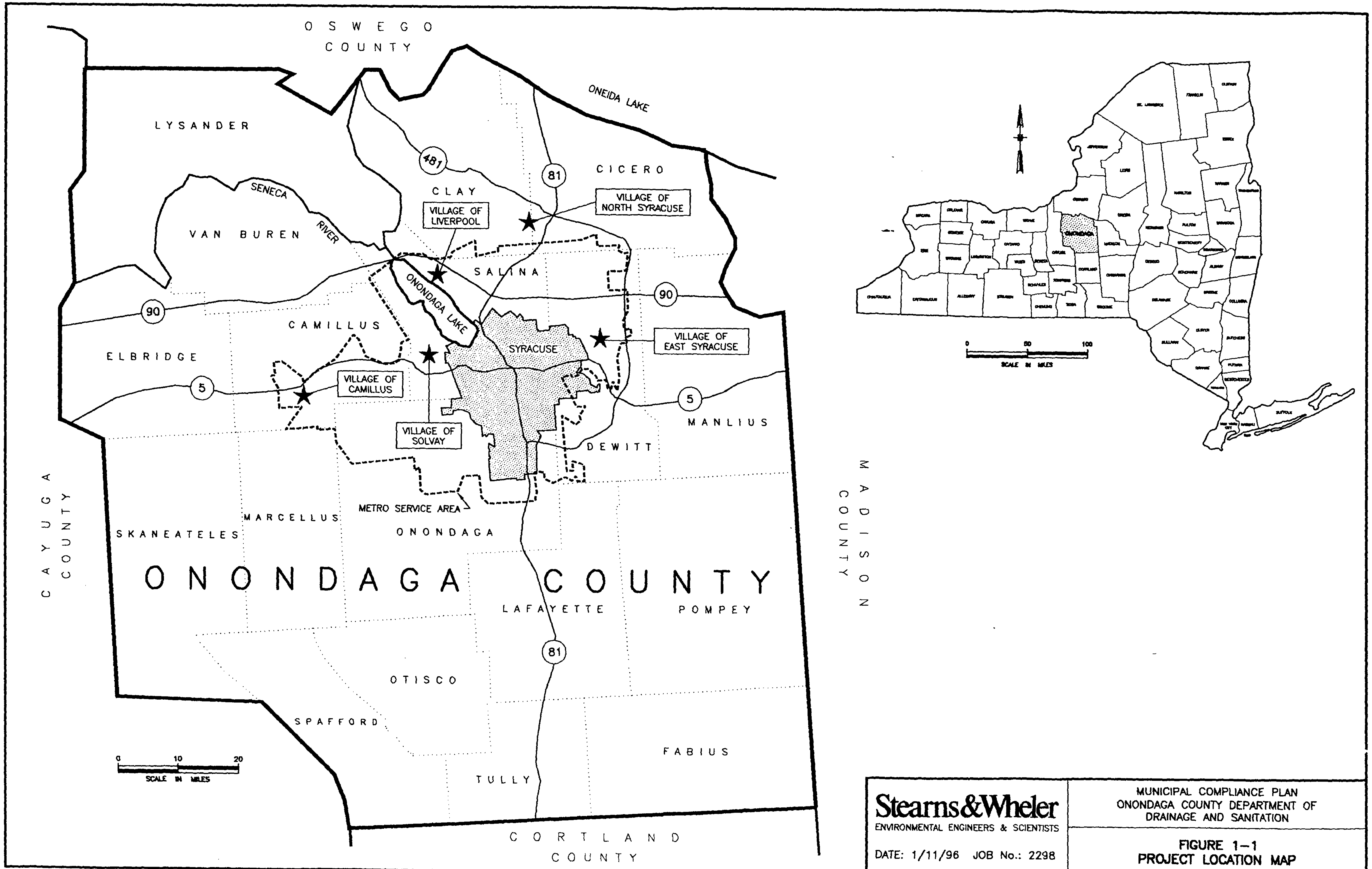
Source: NYSDEC, "Quarterly Status Report of Inactive Hazardous Waste Disposal Sites," Division of Hazardous Waste Remediation, July 1995.

TABLE 1-13

PROJECT SCHEDULE FOR ONONDAGA LAKE BOTTOM RI/FS [1]
Municipal Compliance Plan
Onondaga County, New York

DATE	ACTION
January 1997	Finalize the mercury and calcite models
April 1997	Receive draft ecological and human health risk assessments
July 1997	Provide comments to AlliedSignal on risk assessments
May 1998	Finalize ecological and human health risk assessments
July 1998	Receive draft Remedial Investigation Report
November 1998	Provide comments to AlliedSignal on Remedial Investigation Report
May 1999	Finalize Remedial Investigation Report
September 1999	Receive draft Feasibility Study Report
December 1999	Provide comments to AlliedSignal on Feasibility Study Report
May 2000	Finalize feasibility study
October 2000	Conduct public meetings on proposed remedial action plan
January 2001	Finalize Record of Decision
May 2001	Finalize negotiations of remedial design/remedial construction consent decree
August 2001	Receive draft remedial design
August 2002	Finalize remedial design
April 2003	Begin remedial construction

1 Source: Information provided by NYSDEC at Technical Meeting No. 14 on December 6, 1995

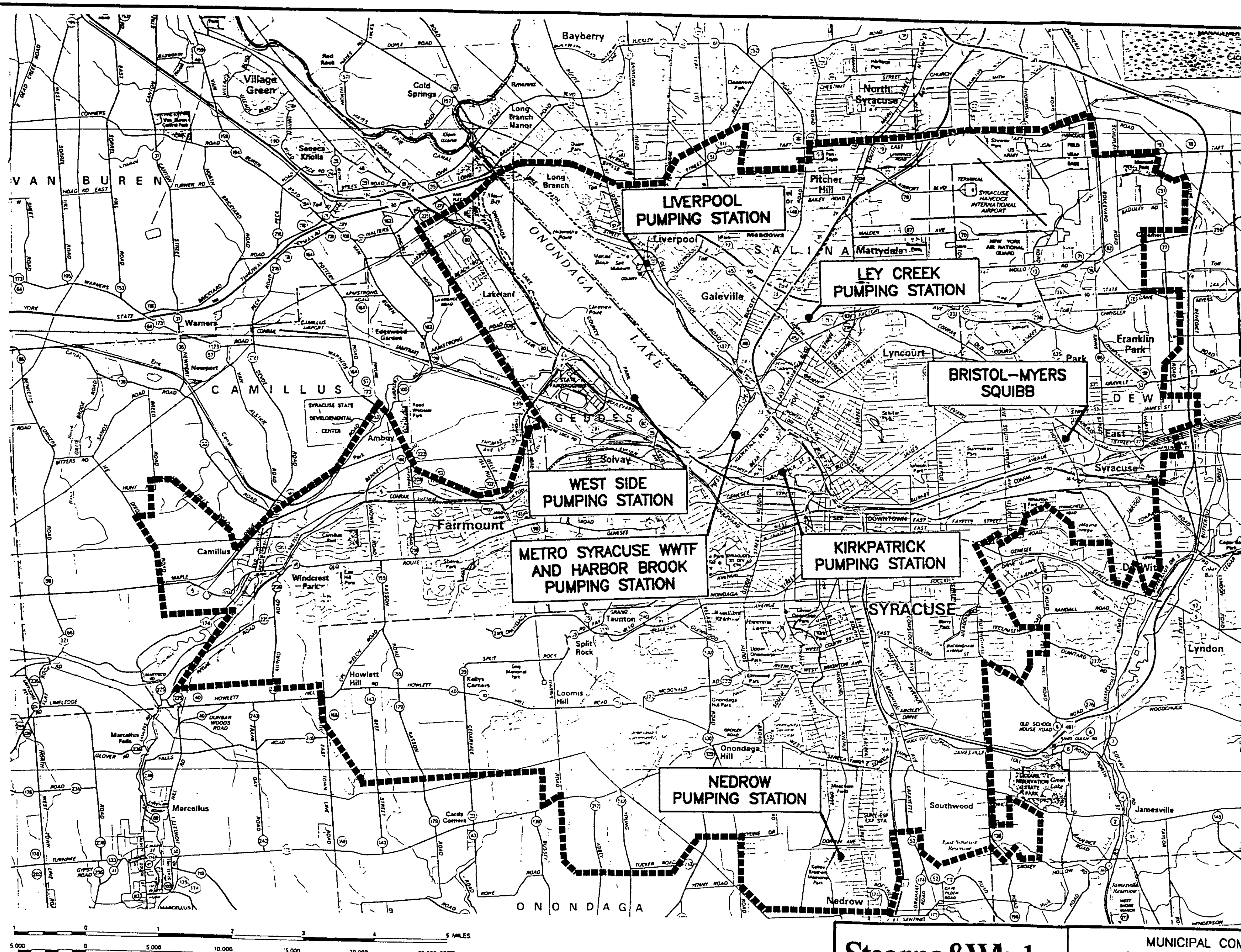


Stearns&Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS

DATE: 1/11/96 JOB No.: 2298

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

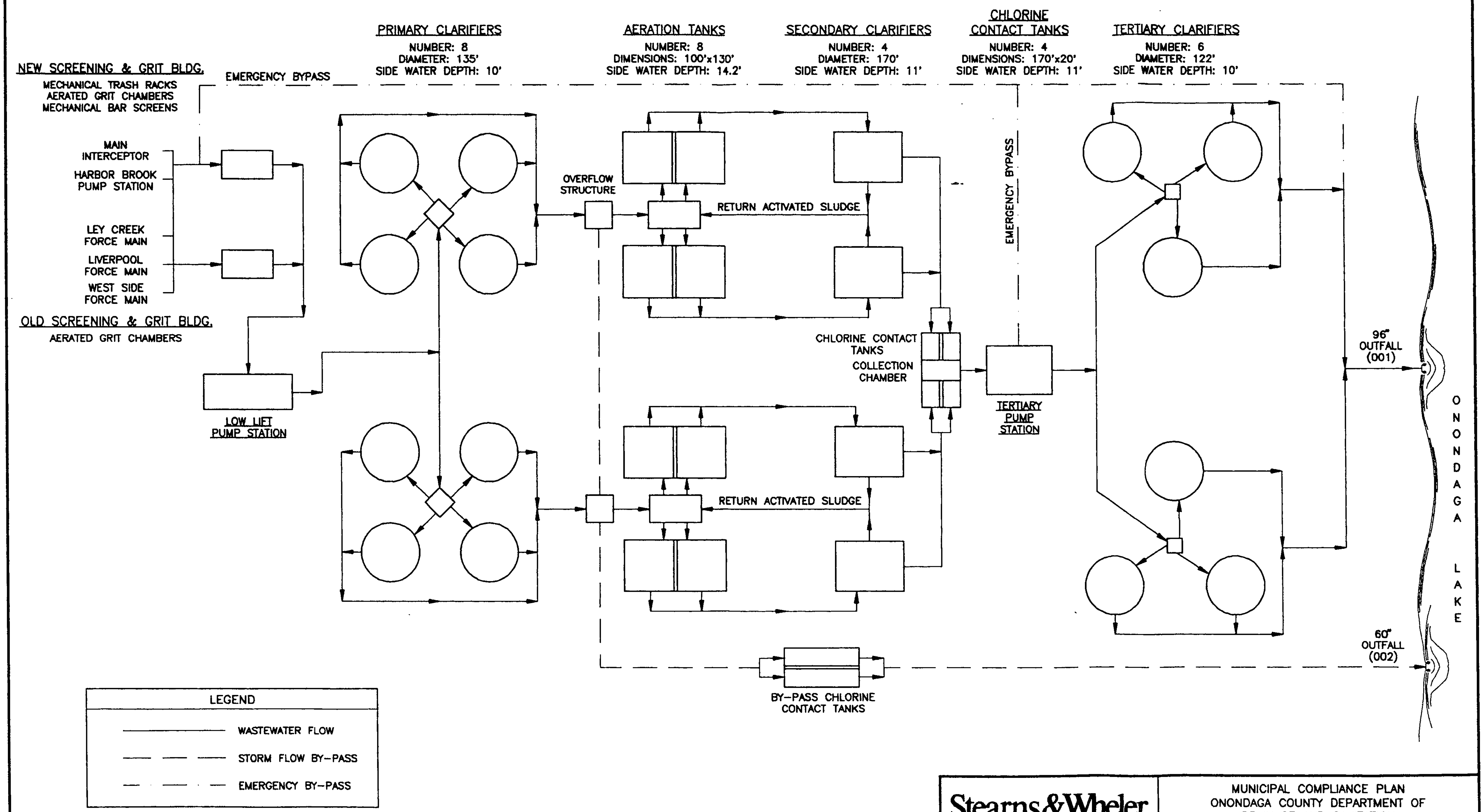
FIGURE 1–1
PROJECT LOCATION MAP



Adapted from: OCDD&S, August 1967

Map adapted from: NYS DEPARTMENT OF TRANSPORTATION (COUNTY BASE MAP SERIES)

Stearns&Wheler ENVIRONMENTAL ENGINEERS & SCIENTISTS		MUNICIPAL COMPLIANCE PLAN ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION
DATE: 1/11/96	JOB No.: 2298	FIGURE 1-2 METRO SERVICE AREA



Stearns&Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS
DATE: 1/11/96 JOB No.: 2298

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 1-4
WASTEWATER PROCESS FLOW SCHEMATIC

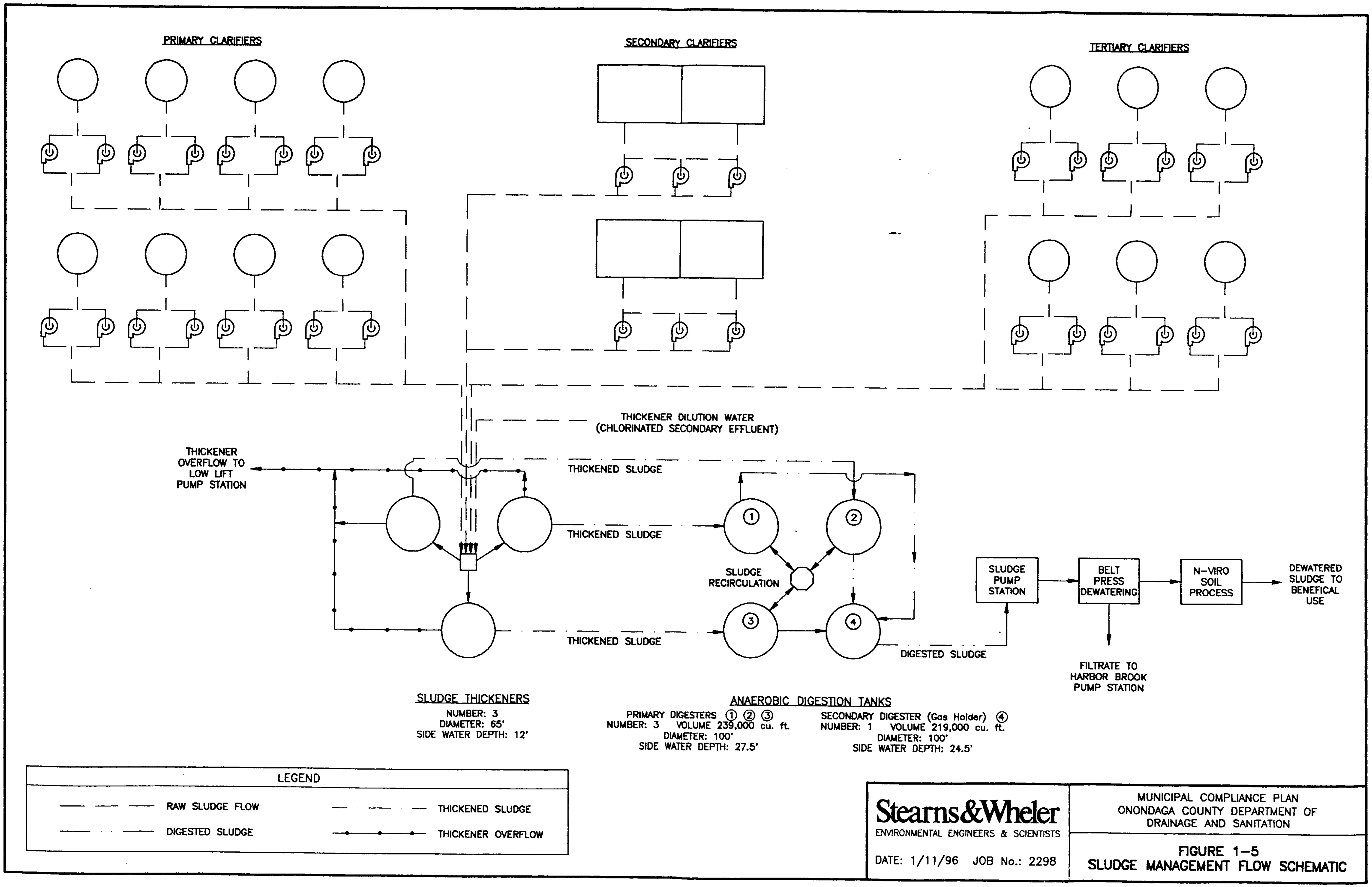
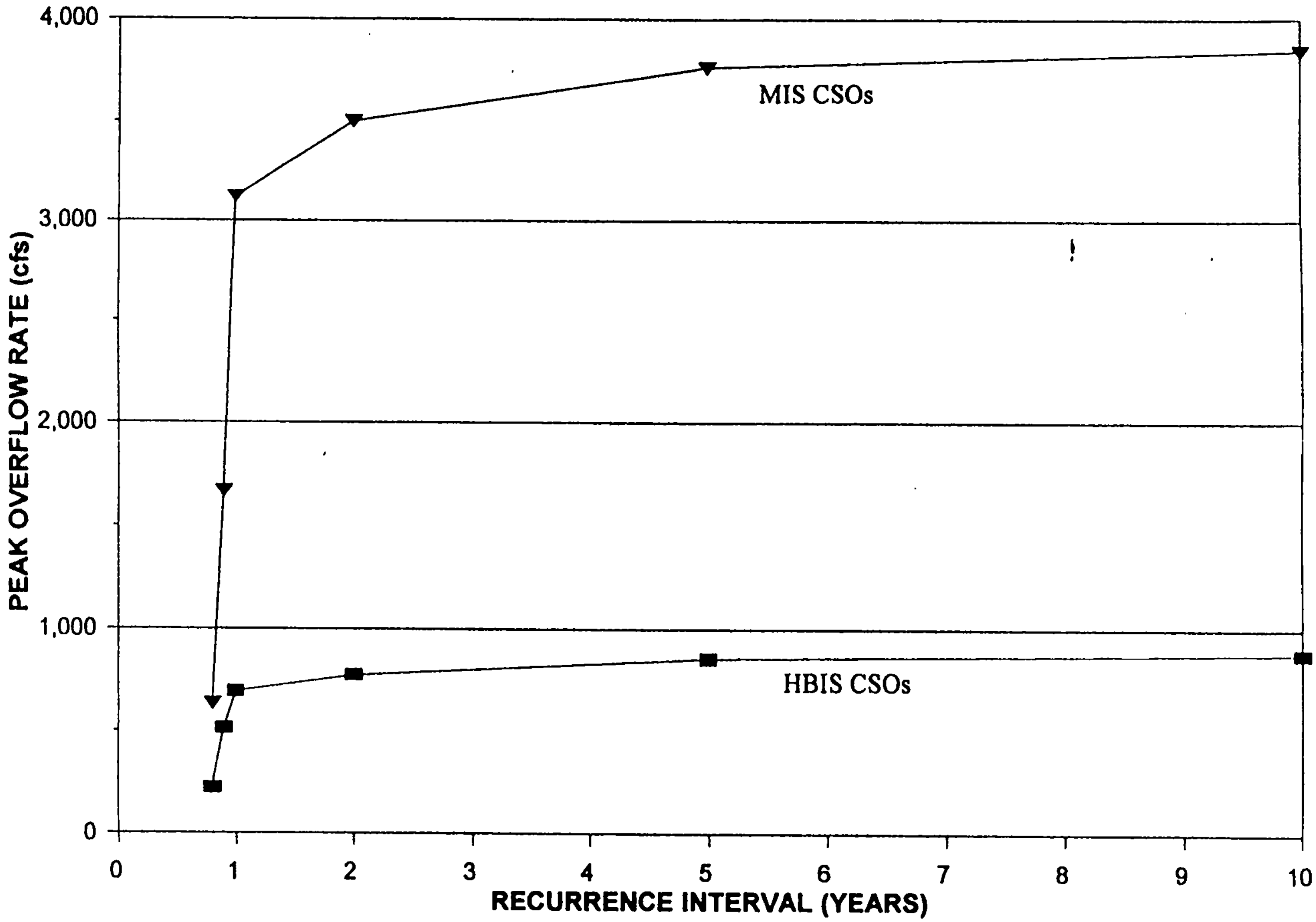


FIGURE 1-5
SLUDGE MANAGEMENT FLOW SCHEMATIC



MOFFA & ASSOCIATES
CONSULTING ENGINEERS

DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
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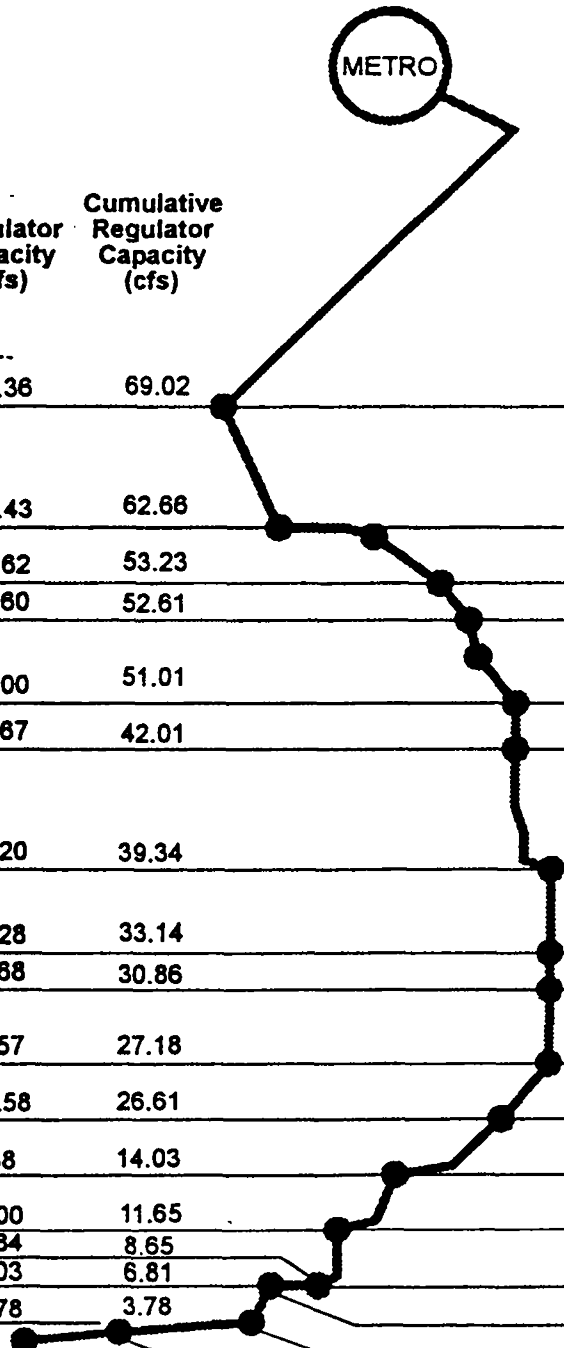
FIGURE 1-6
PEAK DISCHARGE RATES for CSOs on ONONDAGA Cr. and HARBOR Bk. vs. RECURRENCE INTERVAL



Regulator Number	Regulator Capacity (cfs)	Cumulative Regulator Capacity (cfs)	Clean Pipe Capacity (cfs)
	--		46
003	6.36	69.02	
004	9.43	62.66	20
005	0.62	53.23	10
006	1.60	52.61	20
007	9.00	51.01	18
008	2.67	42.01	18
009	6.20	39.34	18
010	2.28	33.14	16
011	3.68	30.86	14.5
013	0.57	27.18	14.5
014	12.58	26.61	13
015	2.38	14.03	11
016	3.00	11.65	7
017	1.84	8.65	7
018	3.03	6.81	
078	3.78	3.78	4
			4
			4

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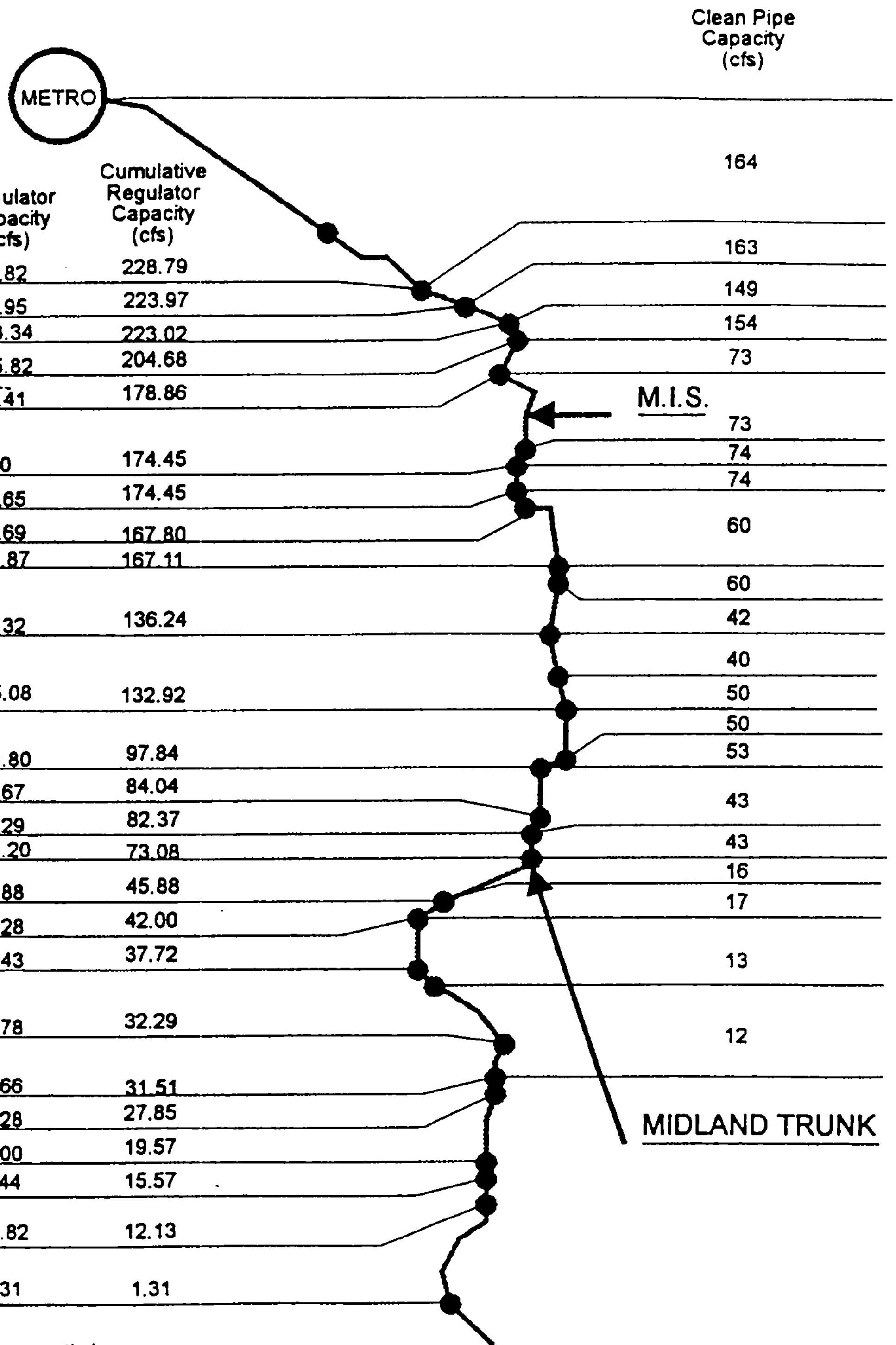
FIGURE 1-7
MAIN INTERCEPTOR SEWER SCHEMATIC

	Regulator Number	Regulator Capacity (cfs)	Cumulative Regulator Capacity (cfs)
	066	4.82	228.79
	065	0.95	223.97
	020	18.34	223.02
	021	25.82	204.68
	022	4.41	178.86
(1)	080	0	174.45
	024	6.65	174.45
	026	0.69	167.80
(2)	030	30.87	167.11
(2)	033	3.32	136.24
(2)	038	35.08	132.92
	039	13.80	97.84
	040	1.67	84.04
	042	9.29	82.37
	043	27.20	73.08
	044	3.88	45.88
	045	4.28	42.00
	047	5.43	37.72
	048	0.78	32.29
	050	3.66	31.51
	051	8.28	27.85
	052	4.00	19.57
	053	3.44	15.57
(2)	060	10.82	12.13
	067	1.31	1.31



(1) Regulator is not currently in use

(2) Summation of regulator capacities in area
(not individual regulator capacity)

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CONSULTING ENGINEERS

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FIGURE 1-8
HARBOR BROOK INTERCEPTOR
SEWER SCHEMATIC

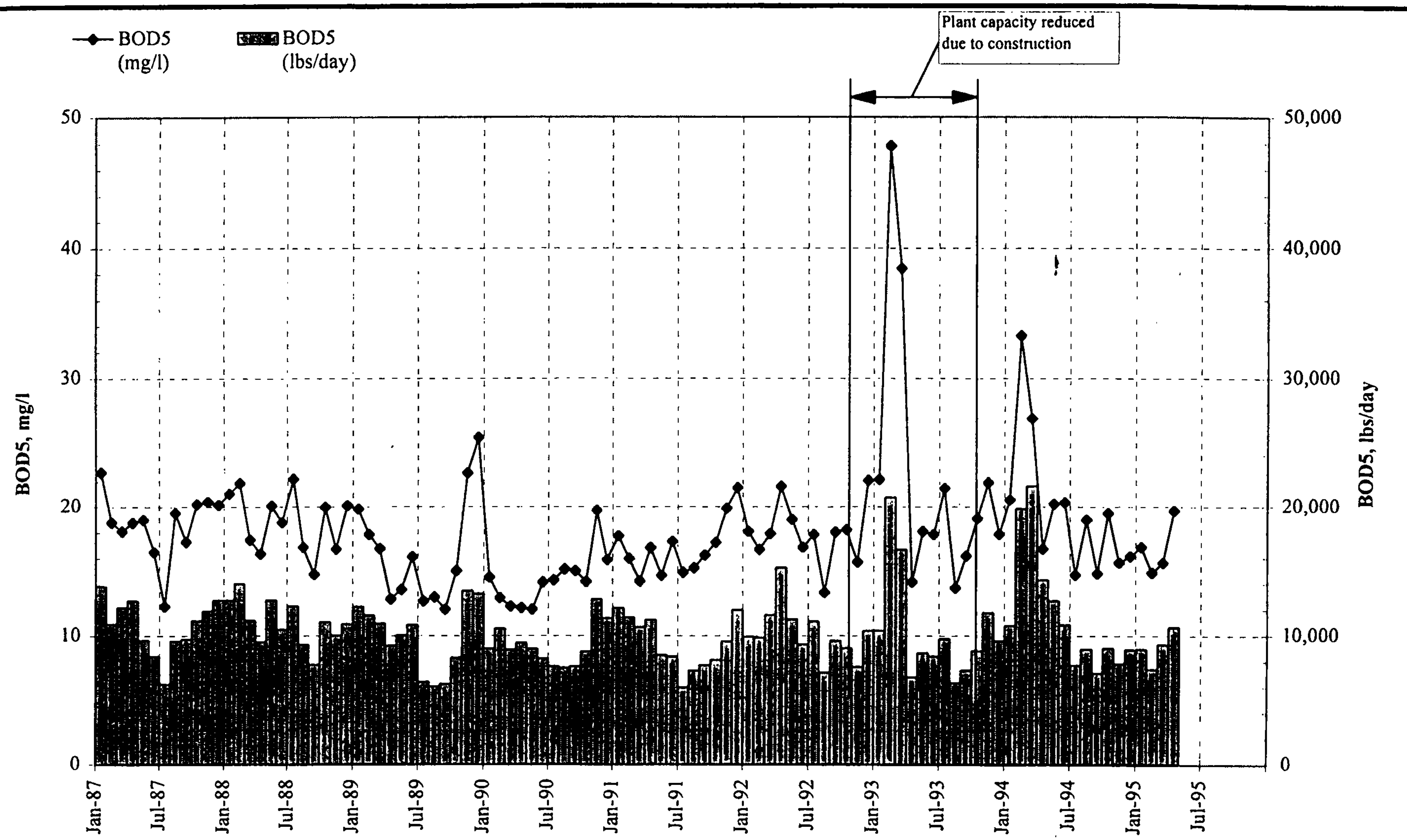

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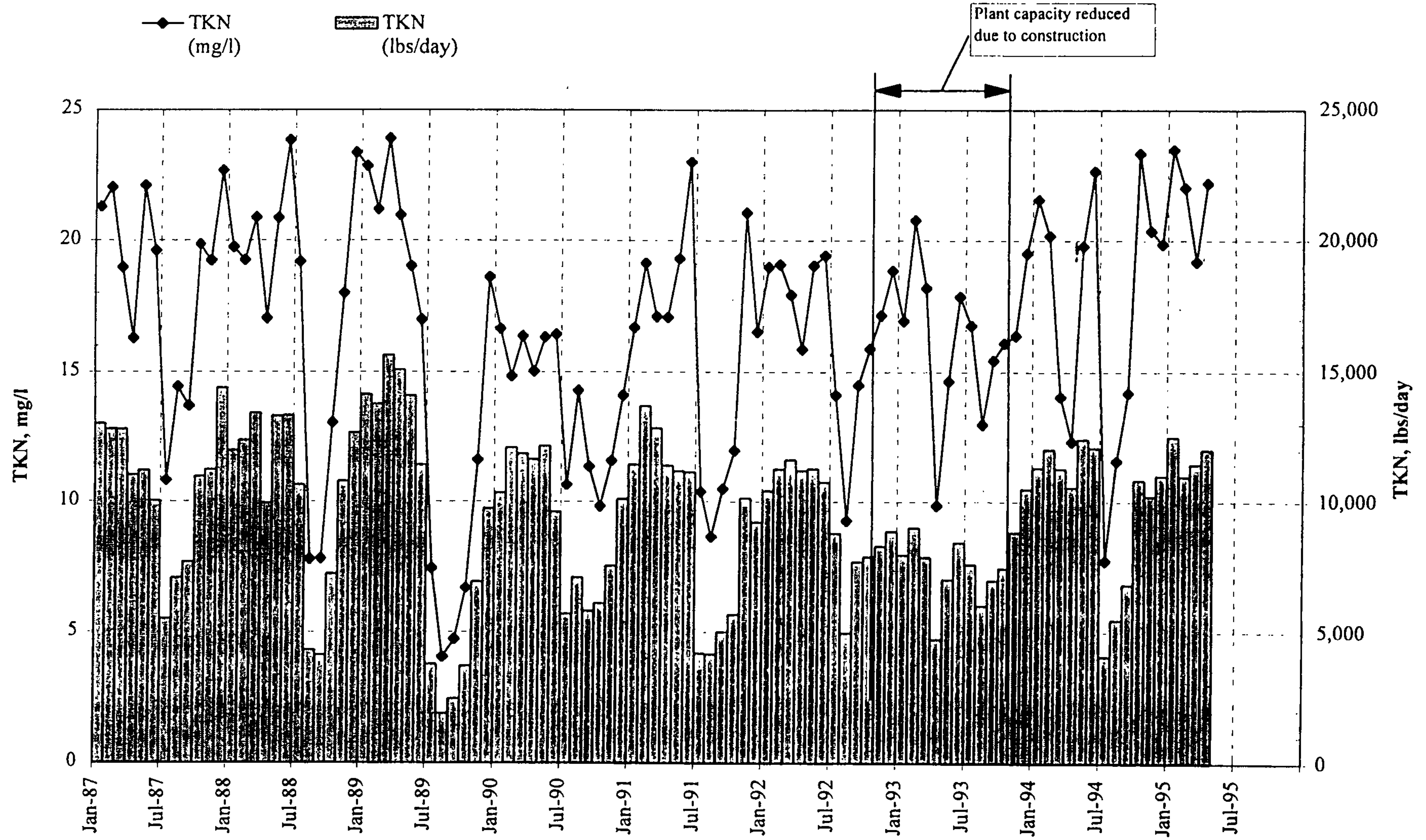
FIGURE 1-9
MONTHLY AVERAGE EFFLUENT
BOD5 DATA - OUTFALL 001



Stearns & Wheler ENVIRONMENTAL ENGINEERS & SCIENTISTS DATE: 1/11/96 JOB No.: 2298	MUNICIPAL COMPLIANCE PLAN ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION **FIGURE 1-12** **MONTHLY AVERAGE EFFLUENT** **TKN DATA - OUTFALL 001**

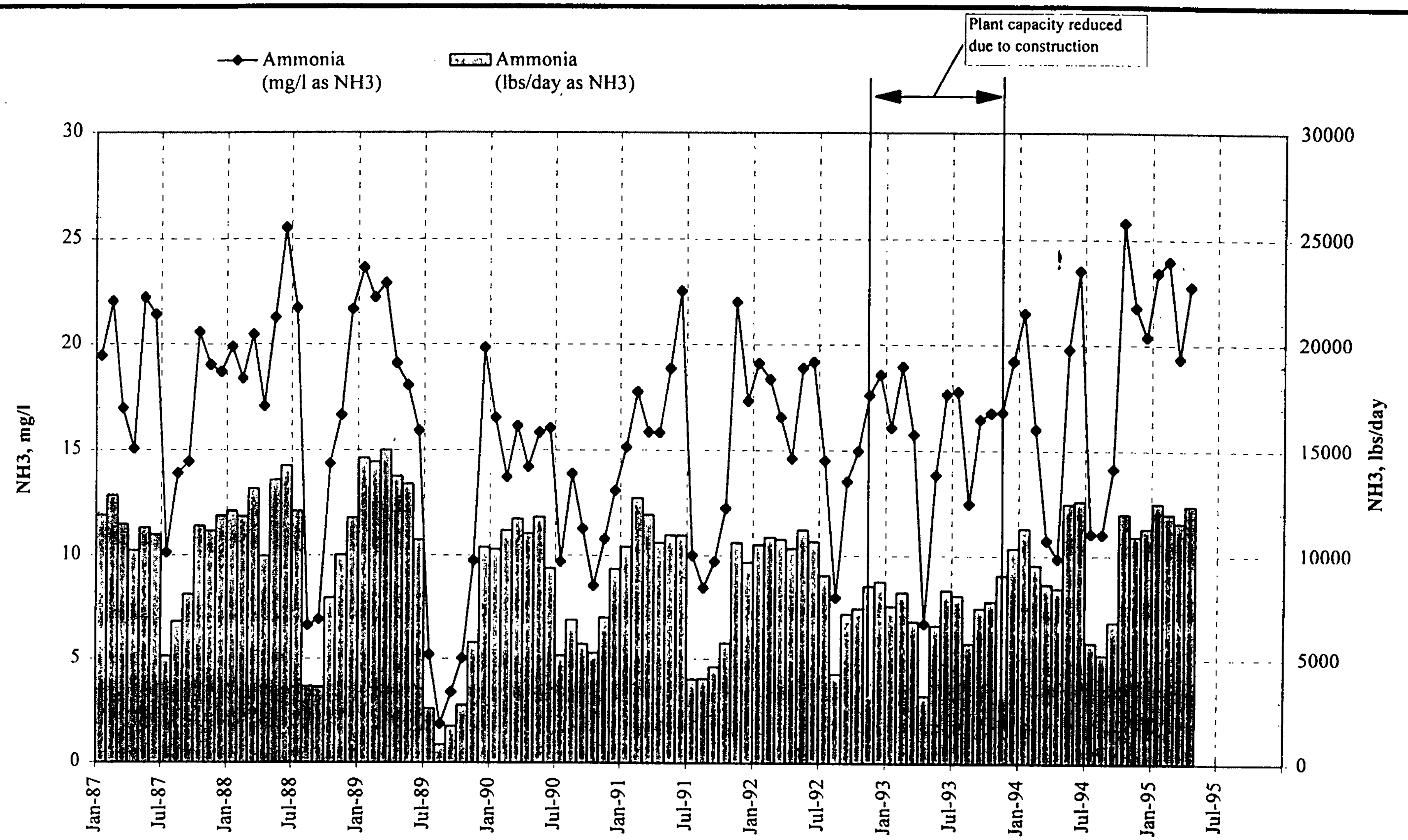


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FIGURE 1-13
MONTHLY AVERAGE EFFLUENT AMMONIA DATA - OUTFALL 001

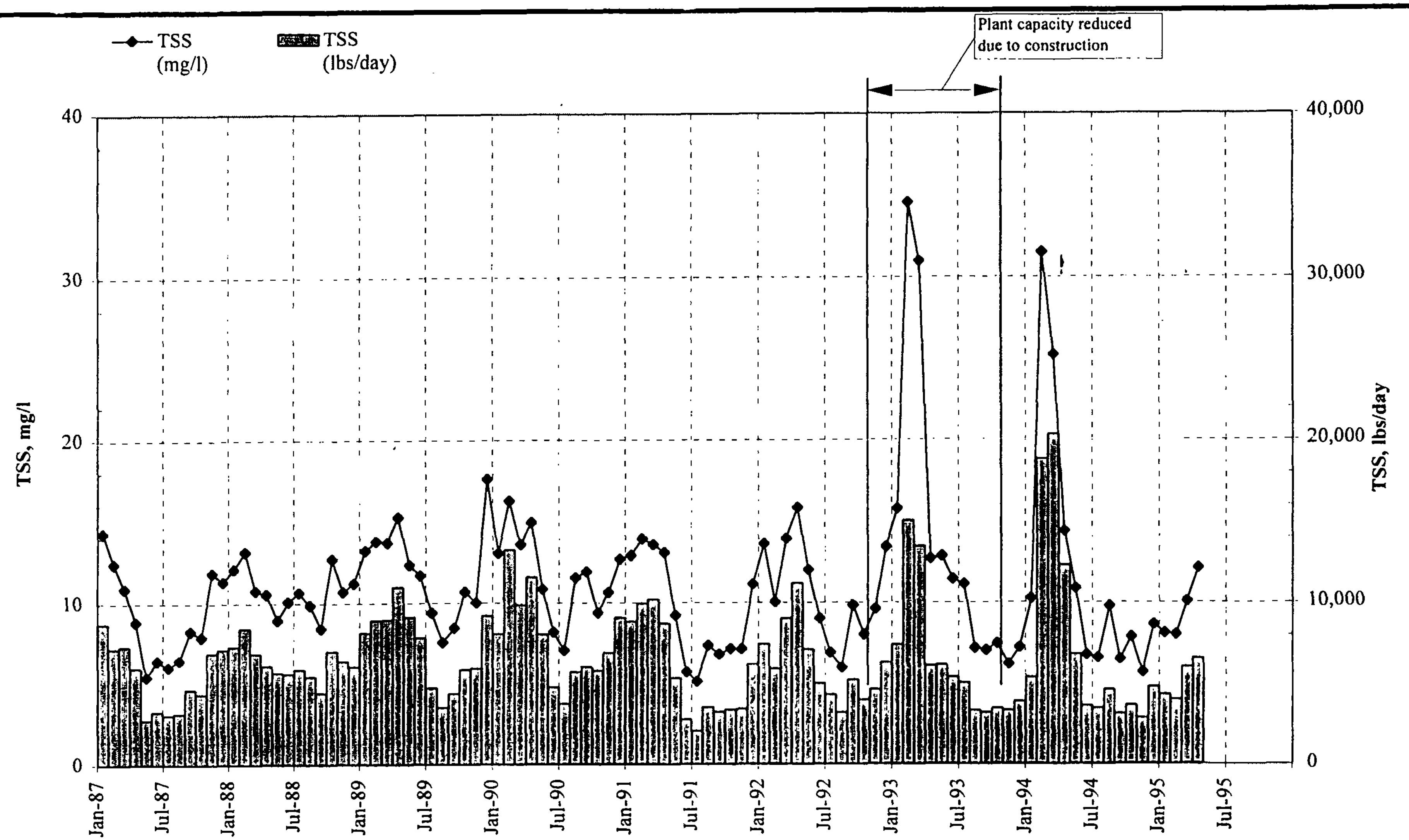

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FIGURE 1-10
MONTHLY AVERAGE EFFLUENT
TSS DATA - OUTFALL 001

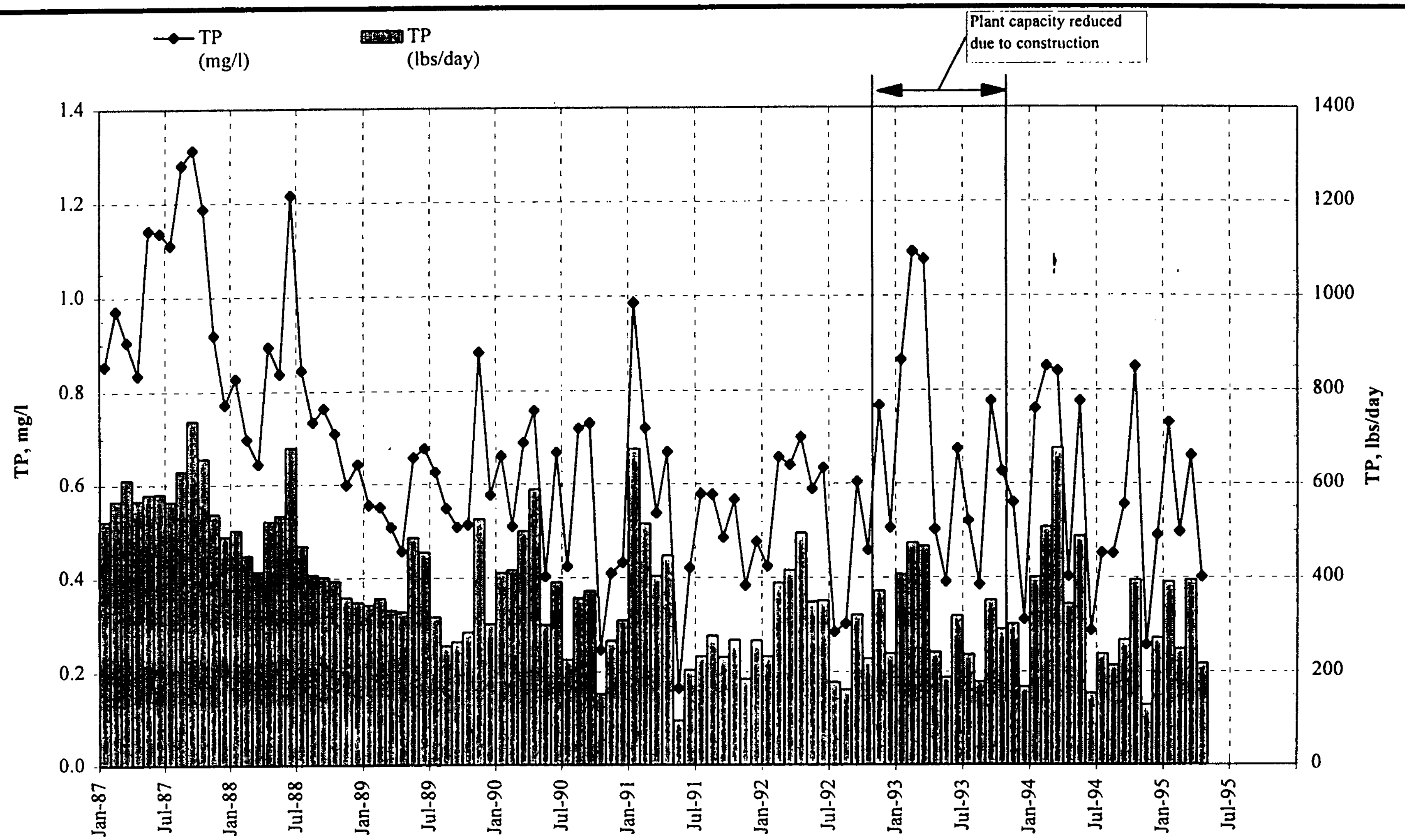

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FIGURE 1-11
MONTHLY AVERAGE EFFLUENT PHOSPHORUS
DATA - OUTFALL 001

Section Two

CHAPTER 2 - WATER QUALITY ISSUES AND WASTEWATER TREATMENT STRATEGIES TABLE OF CONTENTS

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CHAPTER 2

WATER QUALITY ISSUES AND WASTEWATER TREATMENT STRATEGIES

2.0 GENERAL

The need for action regarding METRO and CSOs within the METRO service area is related to current water quality conditions in Onondaga Lake and its tributaries. This chapter provides a brief discussion of current water quality conditions in the lake and tributaries. It describes the water quality impacts of the METRO and CSO discharges in relation to other factors impacting water quality, and explains the strategy selected for abatement of the METRO and CSO impacts in a manner that takes into consideration other ongoing lake remediation efforts. For a more thorough discussion of these topics, the reader is referred to Chapter 2, Section 2.1.2 of the DEIS.

2.1 CURRENT WATER QUALITY CONDITIONS AND FACTORS CONTRIBUTING TO IMPAIRMENT

In New York State, a system of water quality classifications and standards provides a baseline for the assessment of water quality conditions. The identification of water quality classifications and standards applicable to a specific water body involves a formal regulatory process that includes public participation. State regulations that define water quality classifications and standards in general and designate water quality classifications and standards applicable to specific water bodies are listed under Title 6 Chapter X of the State of New York Official Compilation of Codes, Rules and Regulations (6 NYCRR).

Figure 2-1 depicts the official water quality classifications and standards that have been adopted for Onondaga Lake. The water at the northern end of the lake, with the exception of a small area within a 0.25-mile radius at the mouth of Nine Mile Creek, has been designated as Class B water. The defined "best usage" of Class B waters is for primary and secondary contact recreation and fishing. The term "primary contact recreation" refers to activities that involve direct contact with the water to the point of complete body submergence (e.g., swimming, diving, water skiing, and windsurfing). The term "secondary contact recreation" refers to activities where contact with the water is minimal and where ingestion of the water is not possible (e.g., boating and fishing). Class B waters must be suitable for the propagation and survival of fish.

The waters in the southern end of Onondaga Lake, which receive the discharge from METRO, are designated as Class C waters. The defined "best usage" for Class C waters is fishing. Water quality must be suitable for the propagation and survival of fish. In addition, the water quality must be suitable for primary and secondary contact recreation, although other factors may limit use of the waters for these purposes.

WHAT?

One additional distinction that is made in determining the classifications and standards applicable to surface waters in New York State is whether the waters are suitable for the development of a cold water fishery (i.e., a fishery that supports trout). At present, Onondaga Lake is not classified as a cold water fishery.

As illustrated in Figure 2-2, the waters of Onondaga Creek are designated as Class C waters from the point at which the creek enters the lake to Temple Street in the City of Syracuse. The creek's waters are designated as Class B from Temple Street to the point at which an unnamed tributary enters from the west approximately 1.0 mile south of Cold Brook. From the unnamed tributary to the source of the creek, the water quality classification returns to Class C. Current CSO discharges to Onondaga Creek are tributary to the Class B and C sections located downstream of the unnamed tributary. Specific locations of the CSO discharges are identified in Chapter 4 of this report. These sections have not been designated as a cold water fishery.

The waters of Harbor Brook are designated as Class C waters from the point at which the brook enters Onondaga Lake to the upstream end of a covered section of the brook at Gifford Street in the City of Syracuse. From Gifford Street to the point where Harbor Brook crosses the City of Syracuse border, the water is designated as Class B. From the City of Syracuse border to the source of the brook, the water quality classification reverts to Class C. Only the section of Harbor Brook located upstream of the City of Syracuse border has been designated as a cold water fishery. Current CSO discharges to Harbor Brook are tributary to the Class B and C sections located downstream of the City limits. These sections have not been designated for protection of a cold water fishery. Specific locations of the CSO discharges to Harbor Brook are identified in Chapter 4 (see Figure 2-2).

The waters of Ley Creek, which receive the discharges from two active CSOs, are designated as Class C waters from the point at which the creek enters the lake to the location of the abandoned Ley Creek sewage treatment plant. The creek is designated as Class B from the abandoned Ley Creek sewage treatment plant site to the confluence of the north and south branches approximately 3.0 miles upstream of the mouth. Upstream of the confluence of the north and south branches, the water quality classification reverts to Class C. The current CSO discharges to Ley Creek are tributary to the Class B and C sections downstream of the confluence of the north and south branches. These sections have not been designated for protection of a cold water fishery.

An analysis of current water quality conditions in Onondaga Lake and the three tributaries that receive CSO discharges was performed in connection with the preparation of this Municipal Compliance Plan. This analysis considered ambient water quality monitoring data collected by Onondaga County and others, the results of computer-based water quality models developed by Upstate Freshwater Institute and HydroQual, Inc., and other information available from the various studies that have been performed for the lake. The results of this analysis indicate impairment of the designated best usages of the lake and tributaries for primary and secondary contact recreation and fishing. The factors contributing to water quality impairment include the METRO discharge, flow from combined sewer overflows, non-point source pollution, and past industrial waste disposal practices. The following sections provide a brief discussion of the current water quality conditions in relation to ambient water quality standards and identify the factors that contribute to impairment of water quality.

A. **Ammonia.** The ambient water quality standard for ammonia applicable to Onondaga Lake and its tributaries (Class B and C waters) is a function of water temperature and pH conditions. The standard, expressed as total ammonia, is based on protection of fish propagation and becomes increasingly stringent with increasing pH and temperature.

Ammonia concentrations in both the upper and lower waters of Onondaga Lake presently exceed the water quality standards for Class B and C water, established for protection of fish propagation (Figures 2-3a and 2-3b). In recent years, ammonia concentrations have not exceeded the ambient water quality standard for protection of fish survival (Class D standards) as demonstrated in Figures 2-3a and 2-3b. Additional support for the statement that the current concentrations of ammonia do not impair fish survival is provided by the observations of the presence of numerous fish species in the lake and the absence of documented fish kills.

At present, METRO is the single largest source of ammonia loading to Onondaga Lake. Monitoring data compiled for the lake indicate that METRO contributes in excess of 90 percent of ammonia loading received by the lake. As discussed in Chapter 1, the METRO plant was not designed to treat ammonia.

B. **Nitrite.** The current ambient water quality standard for nitrite applicable to Onondaga Lake and its tributaries (Class B and Class C waters) is 100 micrograms per liter (μg/l). Water quality monitoring data collected for Onondaga Lake over the three-year period of 1992 through 1994 indicate periodic exceedance of the standard (see Figures 2-4a and 2-4b). The exceedances appear to be associated with a seasonal pattern of increasing nitrite concentrations during mid- to late-summer conditions. This pattern appears to coincide with periods of increasing METRO effluent nitrite concentrations and decreasing METRO effluent ammonia concentrations, which are indicative of incidental nitrification. These periods occur during the warm summer months when relatively high wastewater temperatures combine with lower wastewater flows and loadings to produce conditions favorable for nitrification at METRO. The presence of effluent nitrite concentrations indicates that the nitrification process at METRO is not complete (nitrite is an intermediate product in nitrification, which involves conversion of ammonia to nitrate) and may be limited by inadequate detention times, insufficient dissolved oxygen, or other factors. The METRO discharge contributes more than 80 percent of the nitrite loading received by the lake. It is expected that upgrading of the METRO plant for ammonia treatment will eliminate the exceedances of the ambient water quality standard for nitrite.

C. **Dissolved Oxygen (DO).** Ambient water quality standards for DO applicable to Onondaga Lake and its tributaries (Class B and Class C waters) specify a minimum daily average concentration of 5.0 mg/l and a minimum instantaneous concentration of 4.0 mg/l. Monitoring data collected for DO in Onondaga Lake indicate that compliance with the ambient water quality standard is easily maintained in the upper waters for most of the year, the only exception being a period lasting from a few days to possibly as long as two weeks during fall turnover when dissolved oxygen concentrations are reduced to slightly below the standard (see Figure 2-5a).

In 1995, water quality monitoring data collected by both Onondaga County and UFI detected the occurrence of a significant and unprecedented reduction of dissolved oxygen concentrations in the epilimnion of Onondaga Lake several weeks prior to fall turnover. Dissolved oxygen concentrations in the epilimnion were reduced below the minimum concentrations required by the New York State ambient water quality standards for Classes B and C waters. Based on a preliminary analysis of the monitoring data, Dr. Steven Effler of UFI has suggested that the reduction of dissolved oxygen concentrations may have resulted from in-lake biological nitrification. If confirmed, this apparently unprecedented observation of significant in-lake nitrification may have occurred in response to extreme low flow conditions resulting from the extended period of dry weather which began during the winter of 1994 and lasted through the summer of 1995. It should be noted that the approved water quality models developed by UFI for Onondaga Lake do not include significant in-lake nitrification. USGS stream flow monitoring data for 1995 is presently unavailable to assess the statistical return frequency of low flow conditions. This information should be available later in 1996. At present, the occurrence is considered to have been an abnormal event associated with extreme low flow conditions. The lower waters (hypolimnion) of Onondaga lake are depleted of DO during summer stratification. DO concentrations fall below 4 mg/l by early June of a typical year; hypolimnetic anoxin persists through fall mixing (Figure 2-5b). Many lakes of moderate productivity exhibit some DO depletion in the lower waters during stratification.

The results of water quality models developed by Upstate Freshwater Institute indicate that sediment oxygen demand (SOD) is the most important factor in contributing to contraventions of the water quality standard for DO in the lower waters of Onondaga Lake. UFI's models for Onondaga Lake have attempted to quantify the factors controlling SOD so that predictions of lake response to remedial alternatives could be made. For example, the relationship between the amount of phytoplankton in the overlying water and the SOD rate is critical to predicting changes in lake DO concentrations in response to changes in trophic state. Over the period of an intensive lake water quality monitoring program (mid-1987 to 1991), UFI measured the exchange of various chemicals and the consumption of oxygen at the sediment-water interface. The UFI model predictions, which are based on measurements of existing conditions, indicate that Onondaga Lake would continue to exhibit hypolimnetic anoxia and low DO concentrations at fall mixing even if the METRO discharge was completely removed.

It is reasonable to expect that the exchange between the sediment and the water would change with changes in water quality conditions. In November 1995, UFI reported predictions of Onondaga Lake DO concentrations based on functional relationships (mathematical summaries of how the chemical exchanges would be altered with changes in the lake water quality) between lake water quality and SOD at the North American Lake Management Society meeting in Toronto, Canada. The phased TMDL process described later in this chapter provides a mechanism for monitoring, research, evaluation, and feedback, as well as enough flexibility in the management system to respond to new information about environmental quality and the performance of existing controls. Therefore, in the future, the new information about DO concentrations may be incorporated into revised water quality models of Onondaga Lake.

D. **Bacteria.** Current New York State ambient water quality standards for bacteria are based on sampling and analysis for total coliforms and fecal coliforms as indicators of sanitary sewage contamination. Ambient water quality standards applicable to Onondaga Lake and its tributaries are summarized as follows:

Total coliforms	The monthly median concentration based upon a minimum of five samples must not exceed 2400 per 100 ml. In addition, no more than 20 percent of the samples collected may exceed a concentration of 5000 per 100 ml.
Fecal coliforms	The monthly geometric mean concentration based upon a minimum of five samples must not exceed 200 per 100 ml.

In accordance with the disinfection policy contained in NYSDEC TOGS 1.3.3, entitled "SPDES Permit Development for POTWs," NYSDEC requires wastewater disinfection from April 1 through October 15 for compliance with applicable water quality standards for bacteria in Onondaga Lake.

In addition to the above standards, the New York State Sanitary Code also specifies water quality standards for bacteria applicable to bathing beaches. This standard specifies that the fecal coliform density determined from five sets of samples collected on consecutive days must not exceed a logarithmic mean of 200 MPN per 100 ml. In addition, when the fecal coliform density of any sample exceeds 1000 MPN per 100 ml, consideration must be given to closing the beach, and daily samples must immediately be collected and analyzed for fecal coliforms for at least two consecutive days.

Onondaga Lake has been closed to swimming since the 1920s due to exceedances of the public health standards for bacteria. Combined sewer overflows occurring within the METRO service area are the most significant sources of bacterial loadings to the lake. These discharges, which consist of a combination of stormwater and wastewater, are activated when the hydraulic capacity of the sewerage system is exceeded during storm flow conditions. A total of 66 overflows are presently active within the METRO service area. These overflows are discharged to Onondaga Creek, Harbor Brook, and Ley Creek approximately 50 times a year.

Although the current lake monitoring program is not designed to fully assess current compliance with the ambient water quality standards for bacteria, particularly the bathing beach standards, the data are sufficient to indicate that the standards are periodically exceeded following wet weather/storm flow conditions.

E. **Floatable and Settleable Solids.** Floatable solids are buoyant, waterborne waste materials and debris that float at or below the water surface. The largest contributing sources of floatable solids to Onondaga Lake and its tributaries are combined sewer overflows and urban stormwater discharges. The debris typically consist of man-made materials, such as plastics, polystyrene, paper, and other constituents. These pollutants are not only aesthetically undesirable, but can be detrimental to both humans and aquatic life. Floatable solids can interfere with navigation by fouling propellers and water intake systems. Aquatic wildlife is impacted by floating material through entanglement and ingestion.

Settleable solids are waterborne waste materials and debris that have a tendency to settle out based on the density and shape of the particles. Sources of settleable solids entering the collection system can include domestic and industrial wastewater and debris washed from streets. Settleable solids present in CSO discharges typically include gravel, sands, silts, clays, and organic matter. The discharge of settleable solids not only affects the aesthetic quality of water, but can also impact water turbidity and dissolved oxygen concentrations, and can carry pathogens in the receiving water. High concentrations of settleable solids can be discharged from a CSO at the beginning of a storm event, known as a "first flush effect." Organic solids that are deposited in receiving waters can also contribute to sediment oxygen demand.

F. **Phosphorus.** The ambient water quality standard for phosphorus is expressed in a narrative rather than numeric form. The standard states that, for all freshwater classifications, there shall be "none in amounts that will result in growths of algae, weeds, and slimes that will impair the waters for their best usages."

To facilitate implementation of the narrative standard, the NYSDEC Division of Water has adopted technical guidance which specifies minimum phosphorus removal requirements for wastewater discharges to lakes and lake watersheds. For situations similar to those faced by Onondaga County (i.e., proposed expansion of an existing discharge that entails a SPDES permit modification), the guidance requires that "the annual quantity (mass loading, flow multiplied by concentration) of phosphorus discharged after the modification does not exceed the phosphorus discharged prior to the modification." In other words, "no net increase" in the annual mass loading of phosphorus discharged is permitted.

In addition, the NYSDEC Division of Water has also adopted an ambient water quality guidance value for phosphorus of 20 μg/l. The guidance value, which is applied only to those waters classified as ponds, lakes, or reservoirs designated as Class B or above, has not gone through the formal state regulatory process for adoption of ambient water quality standards, which includes an analysis of regulatory impacts. The guidance value was developed for protection of the aesthetic quality of water for primary and secondary contact recreation. It was based upon the results of a survey conducted by NYSDEC that correlated general public perception of lake water quality for recreational activities with ambient water quality monitoring data for phosphorus.

Monitoring data for Onondaga Lake indicate exceedance of the ambient water quality guidance value for phosphorus (20 μg/l). Summer average phosphorus concentrations measured in the upper waters of Onondaga Lake presently range, with the exception of 1993, between approximately 60 μg/l and 80 μg/l. In 1993, severe wet weather conditions resulting from the spring melting of record snowfall accumulations, combined with the partial shutdown of the

METRO plant due to CPE-related construction activities produced an abnormally high summer average phosphorus concentration of 155 μg/l for the upper waters in Onondaga Lake.

Phosphorus enters Onondaga Lake from point source discharges (METRO and CSOs) as well as from urban and rural non-point source discharges (stormwater and agricultural runoff) within the watershed. Point source discharges currently contribute approximately one-half of the total phosphorus loading received by Onondaga Lake with some variability based on the amount of rainfall in a given year (wet years have larger inputs from non-point sources).

G. **Salinity/Calcium.** The industrial wastewater discharge to Onondaga Lake from the soda ash/chlor-alkali manufacturing facility operated by AlliedSignal contributed significantly to high calcium concentrations in Onondaga Lake, promoting generation and deposition of calcium carbonate precipitates referred to as oncolites. Much of the near-shore area in Onondaga Lake is presently covered with oncolites (Dean and Eggleston, 1984). These areas, which are important potential areas for fish propagation in the lake, appear to be significantly impacted by the oncolites, limit macrophyte and macrobenthos communities in affected areas.

As discussed in Section 2.1.1.B3.a of the DEIS, results of fishery studies conducted on Onondaga Lake as of 1994 have documented that only 8 of 53 fish species found in the lake actually use the lake for propagation. The remaining fish species propagate elsewhere in the open river system. The lack of appropriate reproductive and nursery habitats, refuges from predation, and extreme weather conditions directly affect reproductive success. These factors presumably interact with the water quality issues of ammonia and dissolved oxygen to limit fish propagation in the lake.

Results of a study performed for the Onondaga Lake Management Conference indicated that fish propagation was significantly improved in pilot test areas where nursery habitat was created through planting of native littoral vegetation (Madsen, January 1994). Spawning rate was 5 to 10 times higher in the pilot test areas than in near or far reference plots. The study results indicated that significant improvement in fish propagation in Onondaga Lake may be possible with restoration of fish habitat in the near-shore areas.

H. **Mercury.** In 1970, sampling identified elevated concentrations of mercury in fish collected from Onondaga Lake. A ban on fishing in Onondaga Lake was imposed as a result of exceedances of the interim action level of 0.5 ppm (total mercury, wet weight basis) established by the U.S. Food and Drug Administration (FDA). In 1986, the fishing ban was lifted to allow recreational fishing on a catch and release basis. Restrictions on the consumption of fish taken from the lake remain in effect based on continued exceedances of the current FDA limit for mercury in fish of 1 ppm (wet weight basis).

In 1994, Onondaga Lake was classified as a federal Superfund site on the National Priorities List (NPL) created pursuant to CERCLA. The NPL listing was made on the basis of the environmental impacts of mercury, PCB, chlorobenzenes, and other hazardous substances. The NPL listing specifically cited the Solvay waste beds, the Semmett residue ponds, and the former Bridge Street and Willis Avenue plants, all of which are associated with the AlliedSignal Corporation as significant sources of mercury contamination in the lake. The external loading of mercury to the lake as well as the contribution of mercury-contaminated lake sediments to the current problems are being investigated under the Remedial Investigation/Feasibility Study (RI/FS) being completed by the USEPA with assistance from the AlliedSignal Corporation. Section 1.3 provides discussion of the current status of the Onondaga Lake bottom RI/FS work.

2.2 WATER QUALITY MANAGEMENT STRATEGY (PHASED TMDL STRATEGY)

Compliance with ambient water quality standards and restoration of the designated best usages for Onondaga Lake and its tributaries present complicated issues that involve County as well as non-County remediation responsibilities. As discussed in the previous section of this chapter, current water quality conditions do not meet the minimum standards established to protect the designated best uses of these waters.

A. **Impairment of Use for Primary and Secondary Contact Recreation.** Use of the lake for primary and secondary contact recreation is presently impaired by exceedances of ambient water quality standards for bacteria and floatable solids. These exceedances are primarily attributable to combined sewer overflows within the METRO service area. The CSOs deliver a mixture of stormwater and wastewater to Onondaga Lake via discharges to Onondaga Creek, Harbor Brook, and Ley Creek. These discharges are only active during certain wet weather (storm flow) conditions when the hydraulic capacity of the sewerage system is exceeded. Abatement of the CSO impacts on water quality will be necessary for attainment of water quality conditions protective of primary and secondary contact recreation, particularly in the northern end of the lake, which is presently designated as Class B waters.

Phosphorus has also been discussed as a factor limiting use of the lake for primary and secondary contact recreation. Phosphorus discharges to the lake contribute to the growth of algae, which can impact the aesthetic quality of water. Phosphorus concentrations in Onondaga Lake presently exceed the ambient water quality guidance value (20 μg/l) developed by NYSDEC for protection of the aesthetic quality of lake waters. As discussed in Section 2.1, the development of this guidance value was based on a survey conducted by NYSDEC which correlated general state-wide public perception of lake water quality for recreational uses with ambient water quality monitoring data for phosphorus in rural lakes. This guidance value may be inappropriate for Onondaga Lake, since results from the approved water quality models indicate that exceedances of the phosphorus guidance value can be expected even if the METRO discharge and CSOs were to be completely removed from the lake. In addition, Onondaga Lake is an urban lake, and local public perception of aesthetic quality may be strongly influenced by cost considerations that were not addressed in the NYSDEC survey.

B. **Impairment of Use for Fishing.** Full attainment of the use of Onondaga Lake for fishing is presently impaired by a number of factors, including mercury and PCB contamination of fish flesh, loss of fish habitat, ammonia and nitrite concentrations in exceedance of ambient water quality standards for protection of fish propagation, and depletion of dissolved oxygen during fall turnover. It would appear, however, that water quality conditions are suitable for fish survival based upon the quantity and diversity of fish species identified through surveys conducted in 1993 and 1994 by Dr. Neil Ringler of the SUNY College of Environmental Science and Forestry (Stearns & Wheler, 1994 and 1995).

As discussed in the previous section of this chapter, the Onondaga Lake fishery is impacted by mercury and PCB contamination of fish flesh. Mercury concentrations in fish exceed the 1.0 ppm standard established by the FDA and presently limit the use of the fishery to a "catch and release" basis. Remediation of the mercury impacts on the fishery in Onondaga Lake is presently under investigation by USEPA and AlliedSignal Corporation in conjunction with the listing of the lake as a federal Superfund site under CERCLA. Remediation of PCB contamination of fish is presently being pursued by NYSDEC in conjunction with state hazardous waste site remediation efforts. The technical feasibility and environmental impacts of potential remediation efforts related to mercury and PCBs are yet to be developed. As a result, the schedule for remediation of mercury and PCB impacts on the lake fishery is presently unknown. The July 1995 NYSDOH Public Health Risk Assessment identified mercury and PCB contamination of the fishery in Onondaga Lake as a hazard to human health. Therefore, any plans for remediation of water quality and restoration of habitat designed to expand the lake fishery must be conducted in parallel with remediation of industrial contamination so as to avoid potentially increasing the risk to human health.

Upgrading of the METRO plant for ammonia removal is necessary for compliance with the ambient water quality standards. Using results from the water quality models developed for Onondaga Lake by UFI and HydroQual, the NYSDEC has proposed to establish a seasonal ammonia limit of 2 mg/l in summer (May through October) and 4 mg/l in winter (November through April).

Contravention of water quality standards for dissolved oxygen has also been identified as a factor limiting full attainment of the designated use of Onondaga Lake as a fishery resource. The hypolimnion is devoid of oxygen during the period of summer stratification, making it inhospitable for propagation and survival of aquatic life.

With the exception of periods lasting for few days to as long as two weeks during fall turnover, dissolved oxygen concentrations in the upper waters of the lake presently meet the ambient water quality standards for dissolved oxygen. A notable exception was late summer 1995, when DO was reduced throughout the water column prior to fall mixing. This phenomenon may have reflected in-lake nitrification, and was likely related to the extreme dry weather conditions which occurred during the spring and summer of 1995. NYSDEC has concluded that water quality-based effluent limits for BOD are not necessary for the METRO plant discharge based on UFI's finding that lake DO is relatively insensitive to BOD inputs from METRO.

C. **Phased Total Maximum Daily Loading (TMDL) Strategy.** In recognition of the complex issues associated with restoration of the designated "best usages" of Onondaga Lake, the NYSDEC and Onondaga County have developed a strategy that involves the phased implementation of capital projects associated with METRO and CSOs. This strategy is consistent with the phased TMDL approach to water quality-based decision making developed by USEPA under the provisions of the Clean Water Act. The phased strategy involves a series of interim and intermediate projects and identification of conceptual long-term actions related to METRO and the CSOs. The strategy provides for ongoing water quality monitoring to examine and measure the impacts of County capital improvement projects on water quality conditions in the lake and the tributaries. In addition, the strategy involves monitoring the status of other non-County-related water quality remediation efforts being undertaken by the NYSDEC and USEPA so as to provide opportunity for appropriate adjustments to planned METRO and CSO improvements if necessary. In this manner, actions to remediate water quality impacts associated with METRO and CSOs will be undertaken in a manner that takes into consideration other non-County-related water quality remediation efforts that will impact the future uses of the lake.

2.3 WASTEWATER TREATMENT STRATEGIES

A. **METRO Syracuse Sewage Treatment Plant.** The phased TMDL strategy that has been developed to address the water quality impacts related to METRO consists of the following elements:

1. Establishment of an initial "cap" on effluent phosphorus and ammonia loadings discharged to Onondaga Lake.

2. Implementation of a series of interim phase improvements consisting of capital projects, as well as operational changes which are intended to optimize the performance of existing facilities for phosphorus and ammonia removal following the anticipated startup of industrial wastewater pretreatment facilities by the Bristol-Myers Squibb Company.

3. Implementation of a series of intermediate phase capital projects designed to upgrade the METRO plant for year-round ammonia removal consistent with seasonal limits of 2 mg/l during "summer" conditions (May through October) and 4 mg/l during "winter" conditions (November through April).

4. Ongoing monitoring of water quality conditions in Onondaga Lake to assess the impacts of the interim and intermediate improvements implemented at METRO.

5. Conceptual long-term alternatives to effect compliance with any water quality standards not achieved by implementing the first two phases.

6. Ongoing assessment of progress and impacts regarding non-County-related water quality remediation efforts.

Implementation of the intermediate phase capital projects will benefit Onondaga Lake and the lake fishery if, and only if, non-County issues (i.e., mercury contamination of fish and restoration of fish habitat) are adequately addressed. Resolution of these other issues will help avoid wastewater treatment facility expenditures that will not, by themselves, result in full restoration of the lake fishery.

The implementation, scope, and scale of conceptual long-term alternatives for METRO are dependent on: (1) progress toward resolution of the non-County-related water quality remediation efforts; (2) analysis and determination of lake water quality response to the interim and intermediate phase improvements at METRO; (3) the long-term impact of zebra mussels on water quality in the Seneca River and Onondaga Lake; and (4) the overall financial and economic health of the community.

Further details on the TMDL strategy for METRO improvements are provided in Chapters 3 and 5.

B. **CSOs.** The phased TMDL strategy that has been developed to address the water quality impacts attributable to CSOs consists of the following elements:

1. Implementation of Best Management Practices (BMPs) for CSOs consistent with the nine minimum controls outlined in the federal CSO control strategy.

2. Implementation of a series of interim capital projects to: (a) abate floatable solids discharging to Onondaga Lake from the Onondaga Creek, Harbor Brook, and Ley Creek

drainage basins; and (b) demonstrate technologies and operational strategies that will apply to proposed intermediate actions.

3. Implementation of a series of intermediate phase capital projects designed to meet presumptive compliance as defined in the New York State CSO Draft Control Strategy (October 1993) and the final federal CSO Control Policy of 1994. At the end of the intermediate schedule, floatable solids and settleable solids will have been abated both in the lake and in the creeks, and bacterial compliance will have been achieved in the lake in accordance with the presumptive definition (violation of water quality standards less than or equal to four events per year).

4. Ongoing effectiveness evaluations and water quality impact investigations to identify the need for additional CSO abatement as may be required.

5. Development of conceptual long-term alternatives (i.e., additional capital/treatment devices as may be required) based on measured water quality impacts resulting from the interim and intermediate phase improvements.

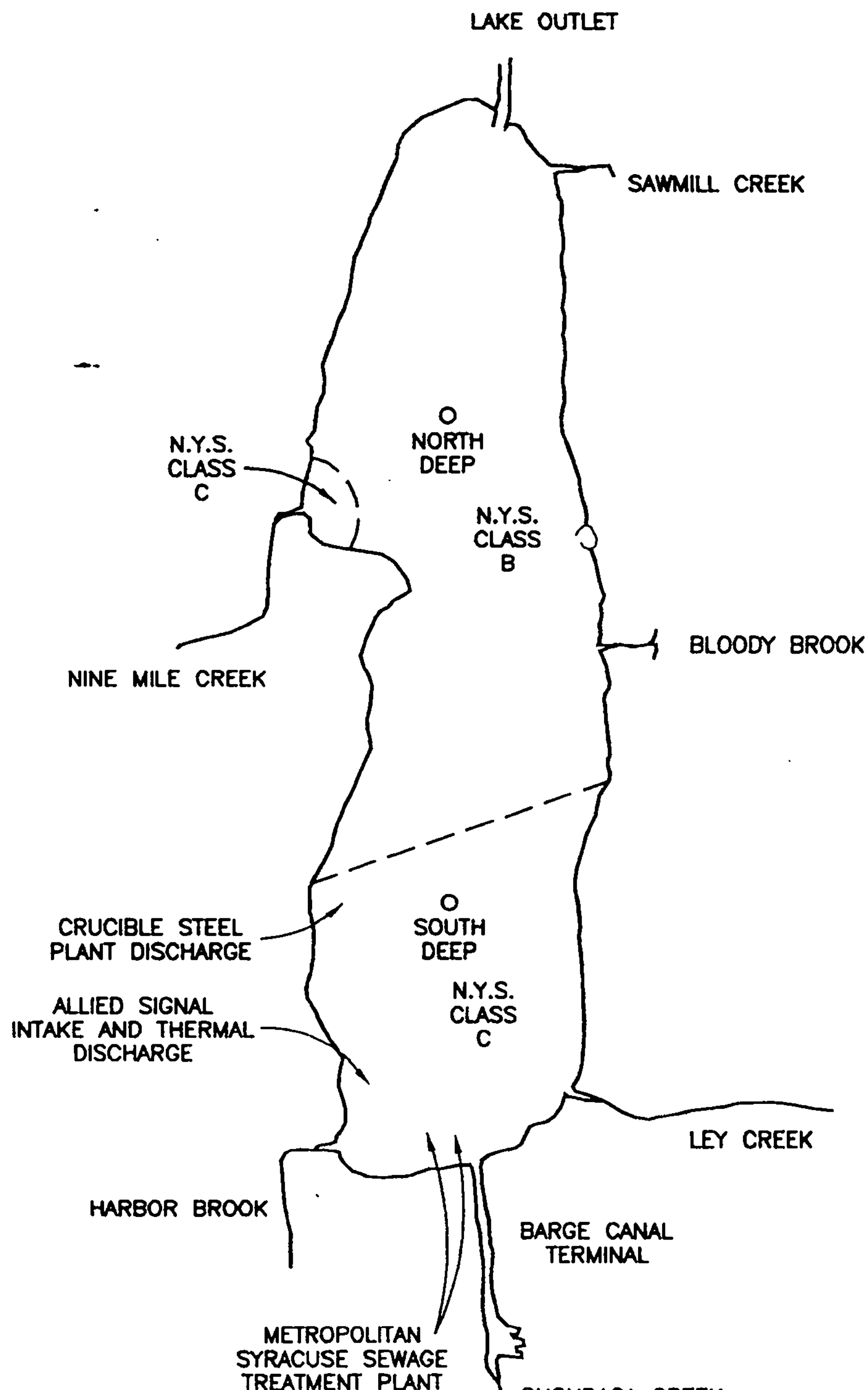

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FIGURE 2-1
WATER QUALITY CLASSIFICATIONS FOR ONONDAGA LAKE

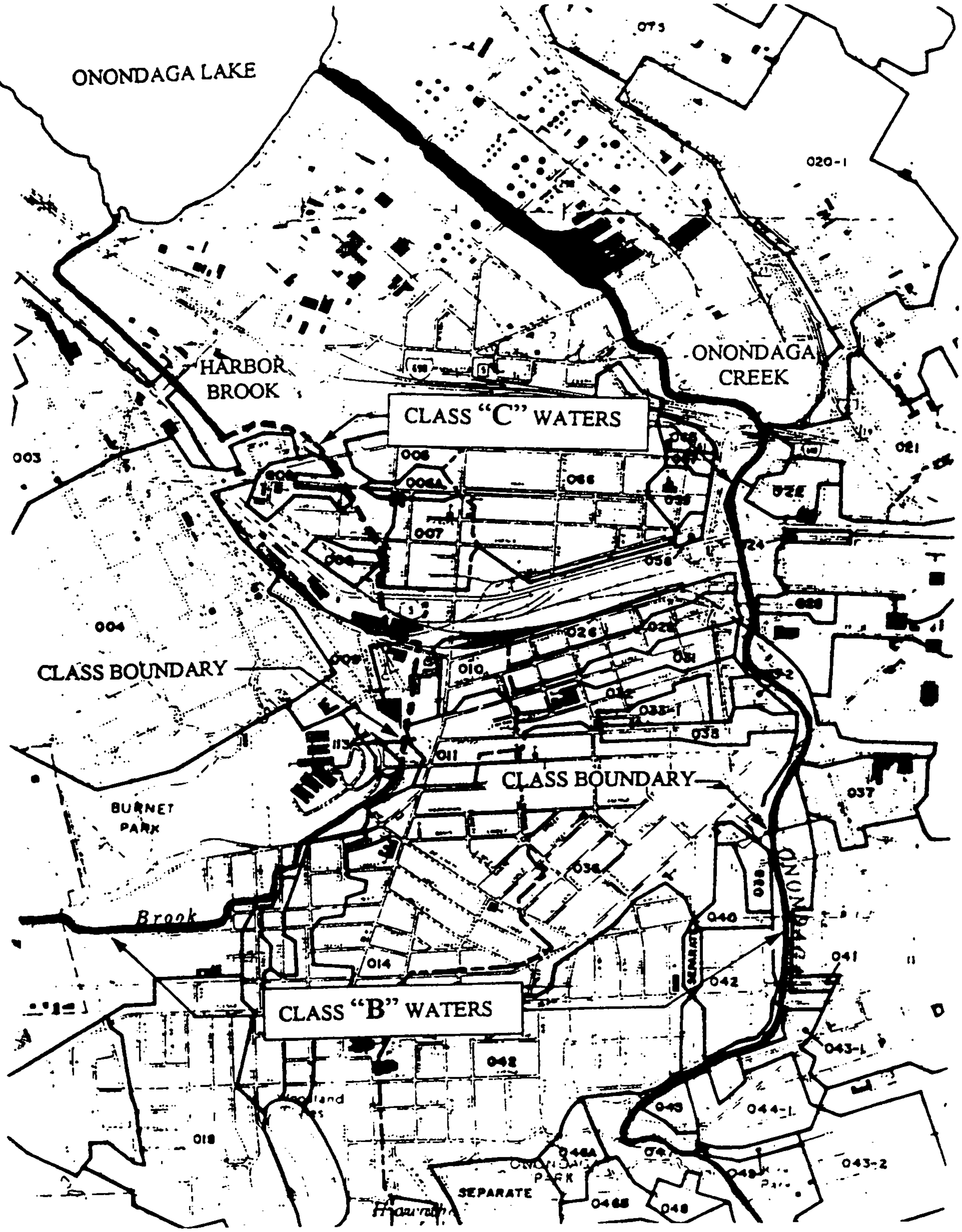

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FIGURE 2-2
ONONDAGA CREEK AND HARBOR BROOK
STREAM CLASSIFICATIONS

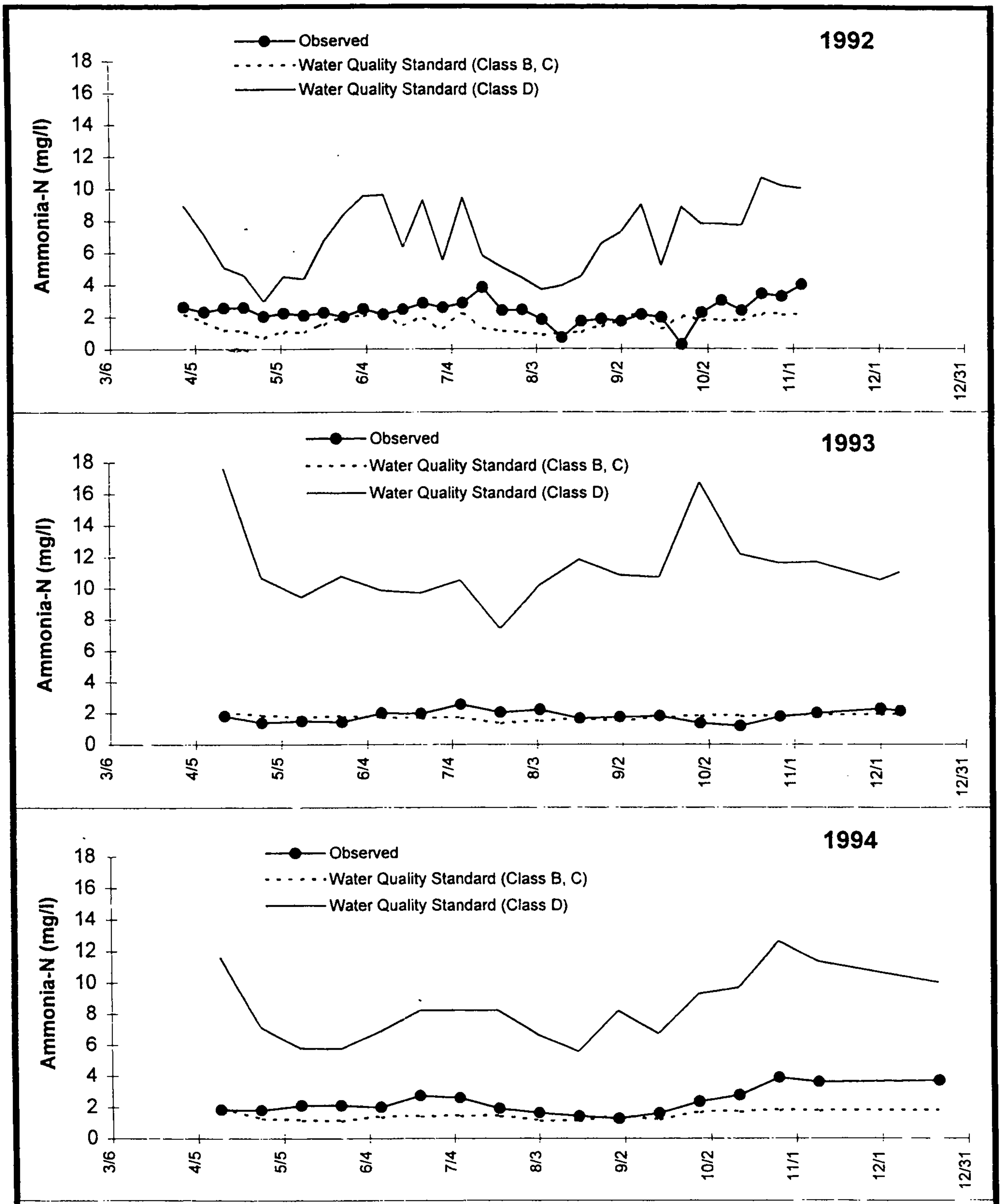

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FIGURE 2-3 A
TOTAL AMMONIA-N IN THE UPPER WATERS (0-9 M) OF ONONDAGA LAKE, 1992-1994

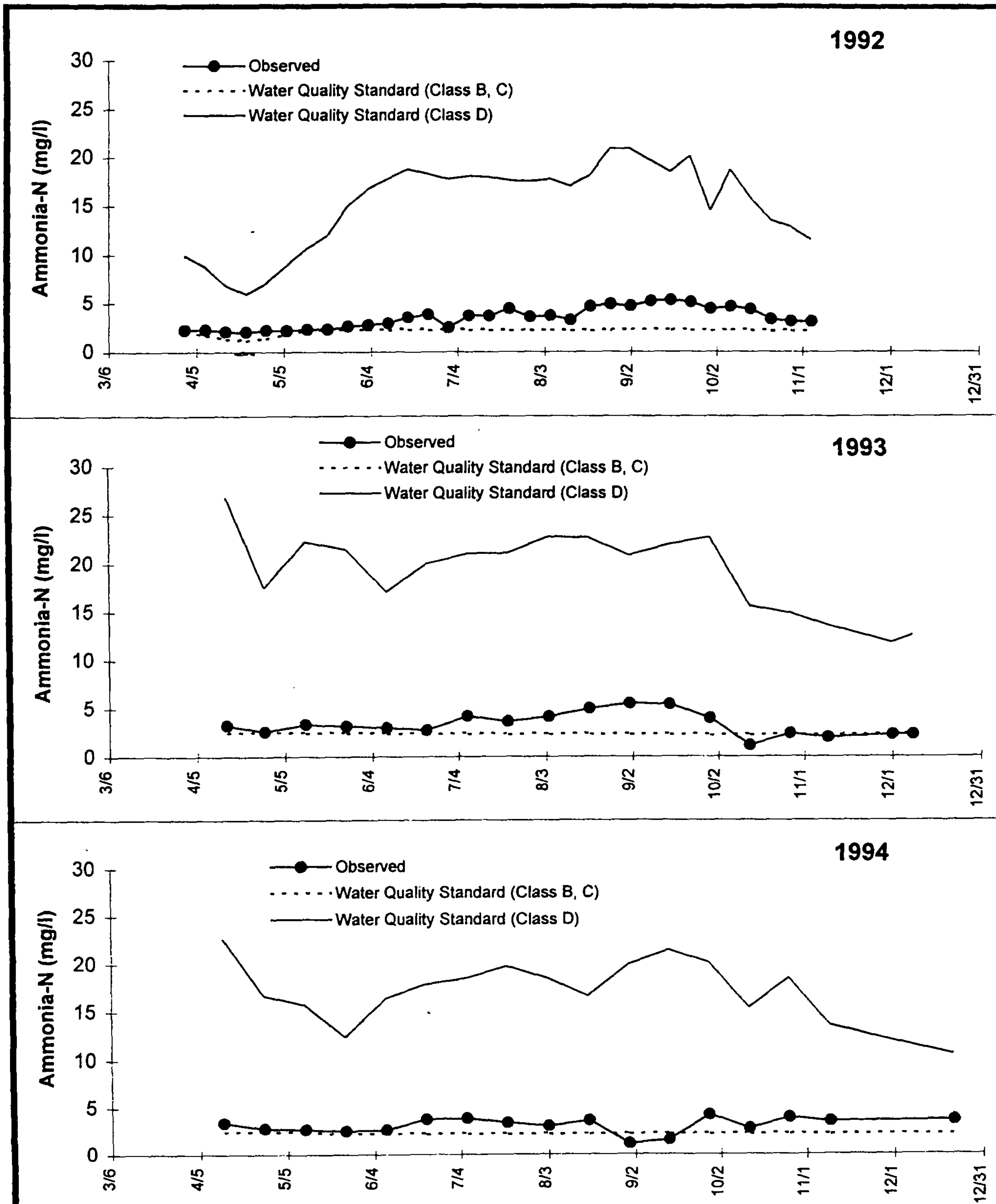

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FIGURE 2-3 B
TOTAL AMMONIA-N IN THE LOWER WATERS (12-18 M) OF ONONDAGA LAKE, 1992-1994

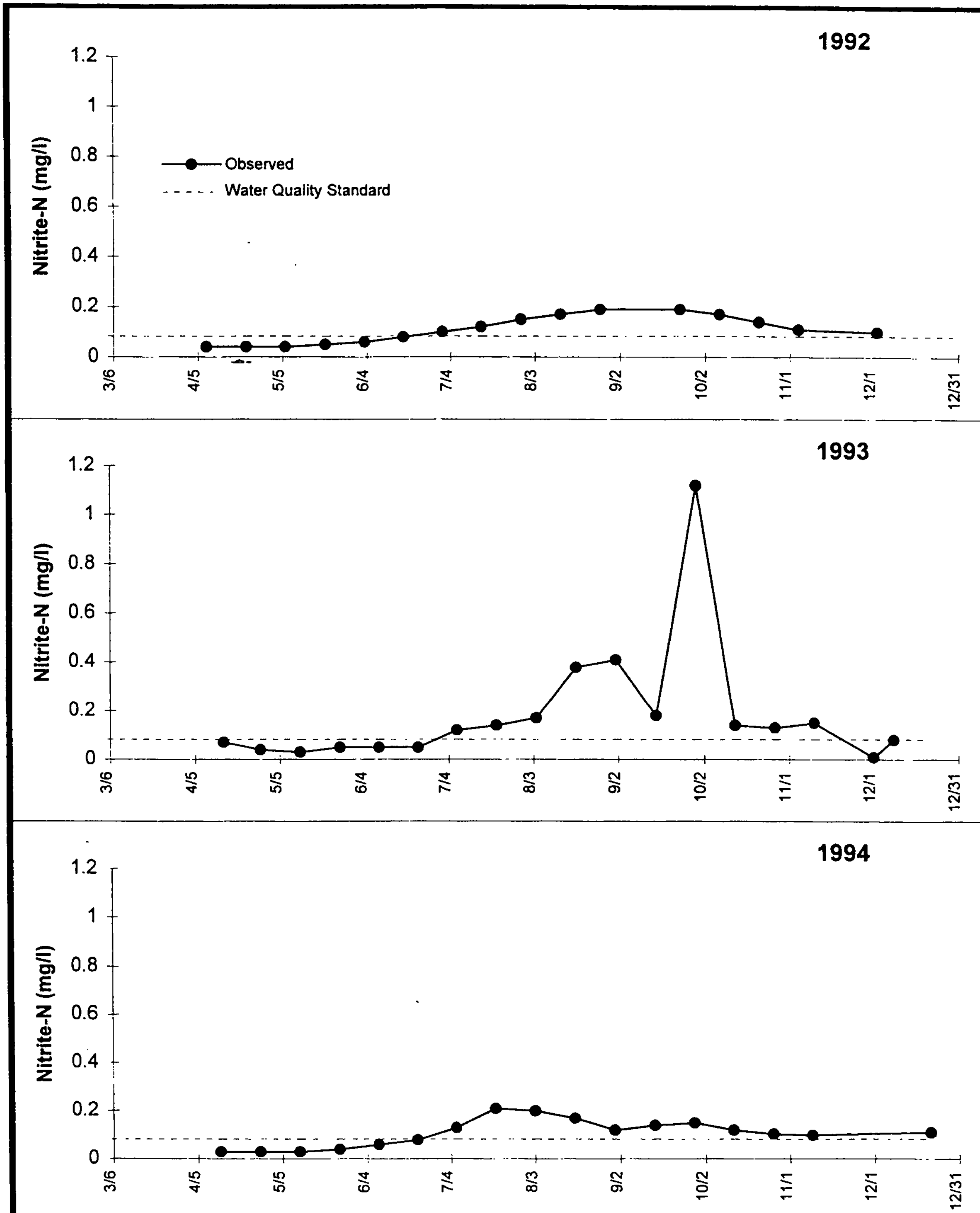

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FIGURE 2-4 A
NITRITE IN THE UPPER WATERS (0-9 M) OF
ONONDAGA LAKE, 1992-1994

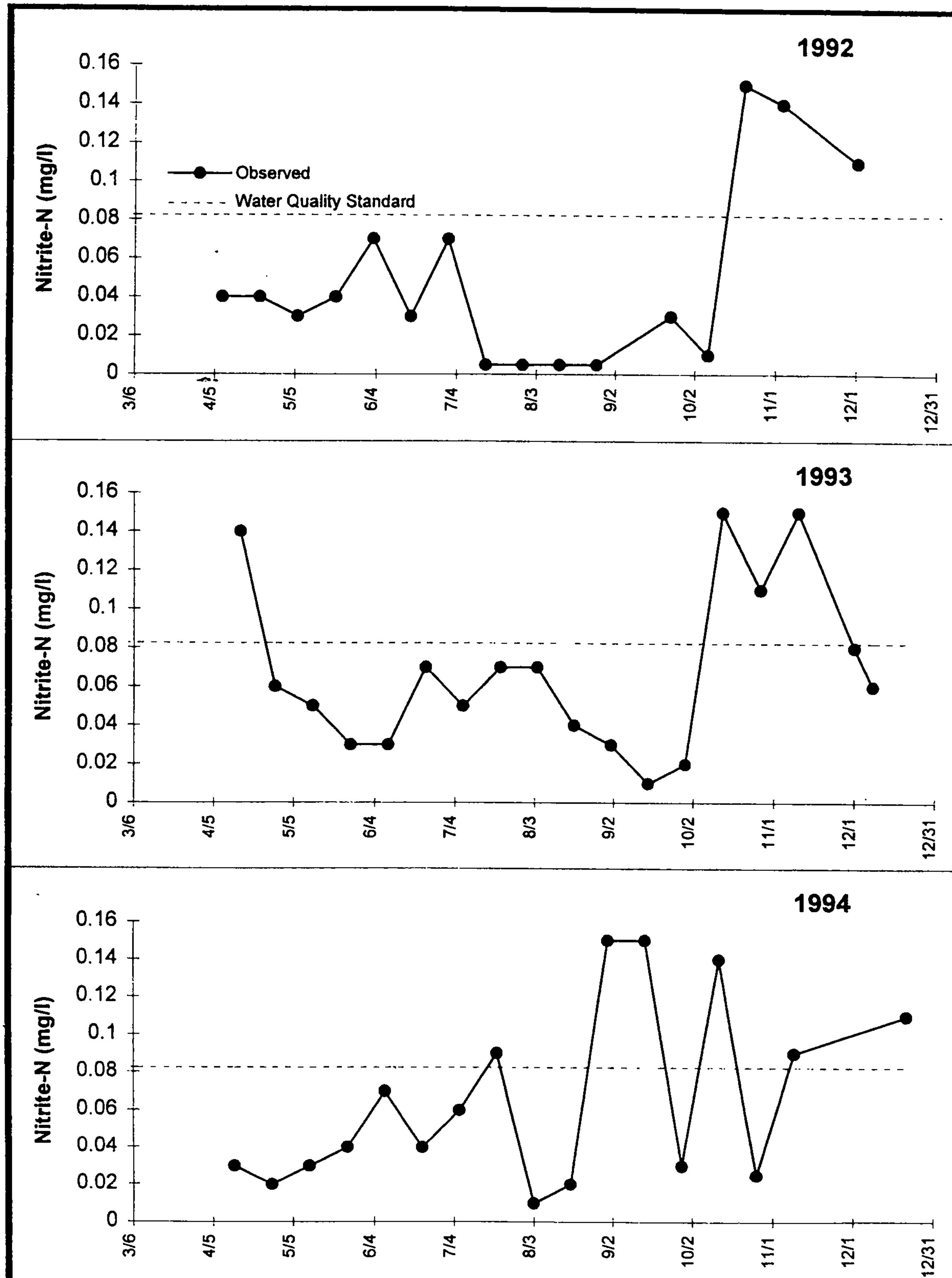

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FIGURE 2-4 B
NITRITE IN THE LOWER WATERS (12-18 M)
OF ONONDAGA LAKE, 1992-1994

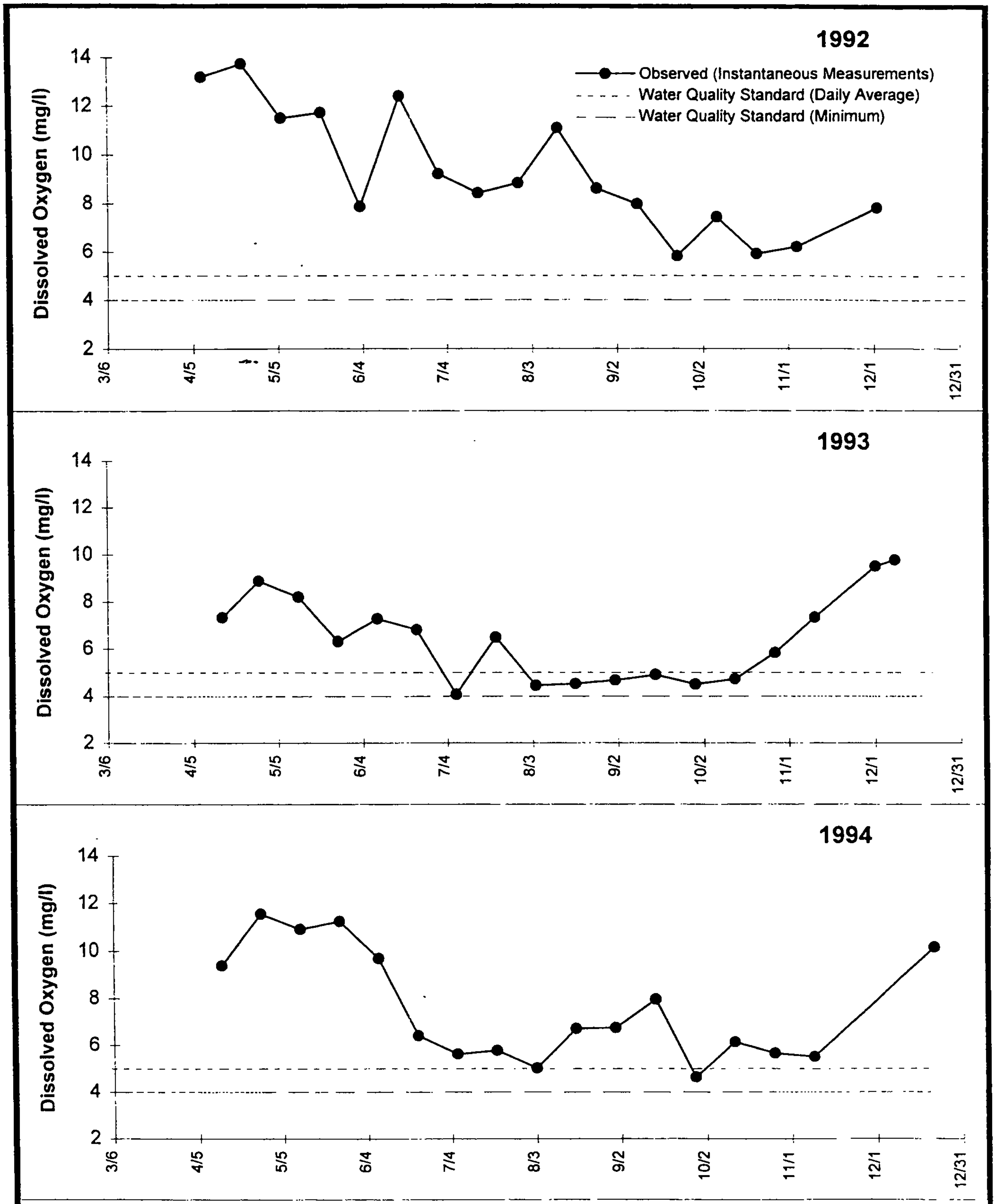

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FIGURE 2-5 A
DISSOLVED OXYGEN IN THE UPPER WATERS (0 9 M) OF ONONDAGA LAKE, 1992-1994

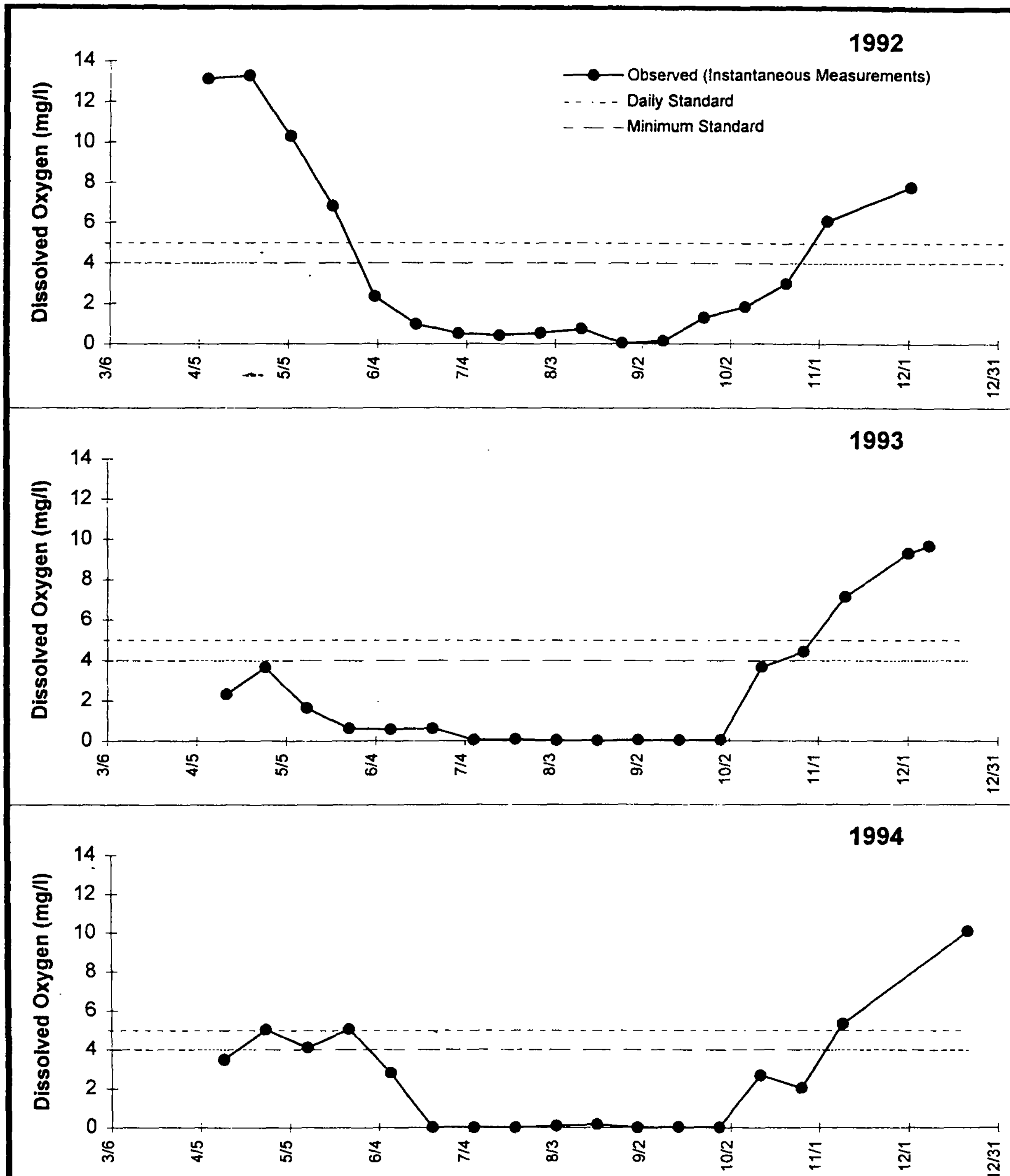

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FIGURE 2-5 B
DISSOLVED OXYGEN IN THE LOWER WATERS (12-18 M) OF ONONDAGA LAKE, 1992-1994

Section Three

CHAPTER 3 - DEVELOPMENT AND EVALUATION OF METRO ENGINEERING ALTERNATIVES
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CHAPTER 3

DEVELOPMENT AND EVALUATION OF METRO ENGINEERING ALTERNATIVES

3.0 GENERAL

The development and evaluation of METRO engineering alternatives has occurred over the past seven years in parallel with the development and refinement of water quality models for Onondaga Lake and the Seneca River. This parallel schedule was established in the Judgment on Consent executed by Onondaga County, NYSDEC, and the Atlantic States Legal Foundation in January 1989.

Appendix C-2 provides a detailed discussion of the history of the development and evaluation of alternatives which preceded the preparation of this Municipal Compliance Plan. In brief, these prior efforts have focused on comparative evaluation of continued discharge of METRO effluent to Onondaga Lake and complete (or partial) diversion of the METRO discharge to the Seneca River. Analysis of these alternatives was performed using the water quality models developed by UFI, as well as the water quality models developed by HydroQual, Inc. in connection with the AlliedSignal RI/FS.

As discussed in Chapter 2, the Onondaga Lake water quality model results have identified the METRO discharge as the primary factor contributing to the contravention of ambient water quality standards for ammonia in Onondaga Lake. Contravention of the ambient water quality standard for ammonia is a contributing factor to impairment of the use of the lake for fishing; in particular, protection of water quality suitable for fish propagation. Monitoring data indicate that the METRO discharge is responsible for approximately 90 percent of the total mass loading of ammonia influent to the lake. For this reason, upgrading of METRO for year-round ammonia removal is required.

To a much lesser extent, the METRO discharge has also been identified as a contributing factor to the contravention of water quality standards for dissolved oxygen. DO concentrations in Onondaga Lake can be expected to improve only slightly even with complete removal of the METRO discharge. Sediment oxygen demand, as impacted by background water chemistry, urban and rural non-point source pollution, and residuals from past municipal and industrial waste disposal practices, appears to be the single largest factor impacting in-lake dissolved oxygen concentrations.

In recognition of the complex water quality issues facing Onondaga Lake and the importance of other non-County-related water quality remediation efforts, a strategy involving the phased implementation of METRO and CSO improvements has been developed. The strategy is based on the phased TMDL approach to water quality improvements, which is used by USEPA in those cases where immediate compliance with water quality standards cannot be attained. The phased strategy for Onondaga Lake provides for the remediation of water quality impacts associated with the METRO and CSO discharges parallel with other non-County-related lake remediation efforts. This strategy also takes into consideration the principles set forth in the policy adopted by the Onondaga County Legislature on August 7, 1995. Elements of the phased approach to METRO improvements include the following:

1. Modification of the METRO SPDES discharge permit to establish an immediate "cap" on effluent phosphorus and ammonia mass loadings discharged to Onondaga Lake. The "caps" will freeze ammonia mass loadings at current levels and capture phosphorus reductions accomplished by METRO above and beyond current SPDES permit requirements.

2. Implementation of a series of interim improvements consisting of capital projects, as well as changes in operating and maintenance strategies to maximize phosphorus and ammonia removal capabilities using existing process tankage following influent wastewater loading reductions resulting from the anticipated startup of industrial wastewater pretreatment facilities by Bristol-Myers Squibb in 1996.

3. Implementation of a demonstration project to assess the technical feasibility and determine the costs and environmental impacts associated with hypolimnetic oxygenation in Onondaga Lake.

4. Upgrade of one quarter of METRO for demonstration of year-round ammonia removal capabilities using conventional and advanced wastewater treatment technologies.

5. Upgrade of METRO for year-round ammonia removal and effluent dechlorination.

Specific elements of the phased TMDL approach to METRO improvements are further discussed in the following sections of this chapter.

3.1 WASTEWATER TREATMENT CAPACITY NEEDS

Table 3-1 summarizes wastewater treatment capacity needs identified for the METRO service area in connection with the preparation of this Municipal Compliance Plan. As shown, the wastewater treatment capacity needs reflect current operating conditions with adjustments for the projected impacts of industrial wastewater pretreatment by Bristol-Myers Squibb and CSO abatement. An allowance for future growth capacity is also provided.

A. **Current Wastewater Flows and Loadings.** Current wastewater flows and loadings were established based on analysis of METRO influent monitoring records compiled over the eight-year period of January 1987 through December 1994. The flows and loadings presented in Table 3-1 represent maximum 12-month rolling average conditions. In the case of BOD_5, suspended solids, phosphorus, TKN and ammonia loadings, 12-month rolling average loadings are based on monitoring data for January 1987 through December 1992 only. Twelve-month rolling average loadings resulting from monitoring data collected from January 1993 through December 1994 are not considered typical of normal influent loading conditions. There was significant internal recycling of pollutants originating from sludge thickening and dewatering operations during this period.

The high internal plant recycle loadings that occurred over the 1993-1994 period may be attributed to reduced sludge digestion capacity resulting from CPE-related construction activities, coupled with the impacts of ferrous sulfate addition to the collection system for odor control. Each of the three primary digesters at METRO was removed from service for cleaning and replacement of mixing equipment. The resulting one-third reduction in digestion capacity may have adversely impacted sludge dewaterability resulting in high recycle loadings. This reduction in digestion capacity was further impacted by ferrous sulfate addition to the collection system for odor control, which generated additional solids for treatment at METRO and may have impacted sludge thickening and dewatering characteristics.

B. **Projected Impact of Industrial Wastewater Pretreatment.** The Bristol-Myers Squibb Company owns and operates a large pharmaceutical manufacturing facility located on Thompson Road in East Syracuse, NY. The facility, which employs more than 1,100 people, is primarily engaged in the production of bulk antibiotics. Process and sanitary wastewaters generated at the facility are combined and neutralized prior to discharge to the METRO sewage treatment plant via the Ley Creek trunk sewer under the authorization of industrial Wastewater Discharge Permit No. 18 issued by the Onondaga County Department of Drainage and Sanitation.

On April 21, 1992, Bristol-Myers Squibb entered a plea of guilty in U.S. District Court in connection with violations of its industrial wastewater discharge permit and the Clean Water Act. As a condition of this plea, Bristol-Myers Squibb agreed to construct and place into operation by December 31, 1996, a wastewater pretreatment facility utilizing "state-of-the-art" technology for reduction of BOD, suspended solids, phosphorus, nitrogen, and solvent discharges to the municipal sewerage system. The cost of this facility was required to range from a minimum of $10 million to a maximum of $30 million.

In accordance with the conditions of the plea agreement, Bristol-Myers Squibb has undertaken an engineering study, including bench-scale and pilot-scale testing, to identify and select a preferred pretreatment system for process and sanitary wastewater discharges. Based on the results of the study, Bristol-Myers Squibb has committed to the implementation of a two-stage biological pretreatment system with an estimated cost of $37 million. The facility is expected to be in operation by December 31, 1996 in accordance with the plea agreement.

Based on the results of the bench-scale and pilot-scale testing, Bristol-Myers Squibb has requested interim limits which would remain in effect for a period of two years following startup of the pretreatment system. Interim limits are requested to allow sufficient time for acclimation of the biological treatment system to the Bristol discharge. Following the two-year acclimation period, final effluent limits are proposed to be developed based upon actual operating data. Proposed interim and tentative final effluent limits are summarized in Table 3-2.

For planning purposes, the projected impacts of Bristol pretreatment on pollutant loadings discharged to METRO have been estimated based on 1992 monitoring data and are summarized in Table 3-3. As shown in Table 3-3, the implementation of wastewater pretreatment by Bristol-Myers

Squibb is anticipated to achieve a significant reduction of pollutant loadings discharged to the METRO plant.

C. **Capacity for CSO Abatement.** The implementation of proposed CSO abatement facilities described in Chapters 4 and 5 of this report will result in additional flows and pollutant loadings conveyed to METRO for treatment. The development of flows and loading projections for CSO abatement facilities is discussed in detail in Chapter 4, Section 4.1.B2, of the DEIS. Flows and loadings to be conveyed to METRO from CSO abatement facilities for treatment are expected to vary seasonally (Table 3-4). Higher flows and loadings are expected to occur during the summer months.

D. **Allowance for Future Growth Capacity.** In considering the need to upgrade the METRO plant, it is prudent to include some allowance for future wastewater treatment capacity. Although the need for planning to allow for future growth is recognized in the "Onondaga County Plan: A Development Guide for 2010," little quantitative information has been assembled to date on future wastewater treatment capacity needs within the METRO service area. Several needs are identified in the 2010 Development Guide, including:

- Requested expansion of the sanitary district in Camillus, including West Hill and Howlett Hill.

- Proposed construction of the Southwest Branch Pipeline by the Metropolitan Water Board, which will encourage new water distribution systems and development in northeastern Camillus.

- Recommended conversion of the 0.1 mgd Greenfield Village STP to a pump station tributary to METRO.

- Opportunities for residential and commercial redevelopment in the City of Syracuse and the Towns of Salina, Geddes, and Dewitt.

Based on discussions with representatives of the Department of Drainage and Sanitation, a nominal allowance for future development of 4 mgd was selected for planning purposes at this time. This capacity represents approximately a 5 percent increase in the current maximum 12-month rolling average wastewater flow influent to METRO. This increase is equivalent to the wastewater capacity needs of a population of approximately 40,000 people, based on a wastewater generation rate of 100 gallons per person per day, including infiltration.

E. **Wastewater Treatment Plant Design Capacity.** As shown in Table 3-1, the projected average daily flow for the METRO service area is 84.2 mgd. In accordance with current NYSDEC guidance for municipal wastewater treatment plants serving areas with combined sewers, full treatment must be provided for a peak wastewater flow of 126.3 mgd -- 150 percent of the design average daily flow. Incremental wet weather flows in excess of 126.3 mgd will receive treatment consisting of raw sewage screening and grit removal, primary settling, and effluent disinfection prior to discharge. As discussed in Chapter 1, the current peak flow capacity through full treatment at METRO is 120 mgd. Expansion of this capacity by approximately 5 percent will be required to meet the projected wastewater treatment capacity needs.

Projected METRO influent BOD, suspended solids, phosphorus, TKN, and ammonia loadings all represent reductions from current operating conditions due to the impact of industrial wastewater pretreatment by Bristol-Myers Squibb. Projected loadings represent 73 percent of current loading conditions for BOD_5, 96 percent for suspended solids, 95 percent for phosphorus, 80 percent for TKN, and 94 percent for ammonia.

3.2 "NO ACTION" ALTERNATIVE

The "no action" alternative involves the continued discharge of METRO effluent to the upper waters of Onondaga Lake at current treatment levels for BOD, suspended solids, phosphorus, and ammonia removal. Since the METRO plant is currently operating at or near the original design capacity, this alternative does not provide adequate treatment capacity for CSO abatement or future growth within the service area.

In addition, the "no action" alternative does not address the contravention of ambient water quality standards for ammonia and dissolved oxygen in Onondaga Lake. Since METRO has been identified as the primary factor contributing to exceedance of the ammonia standard and, to a much lesser extent, as a contributing factor (along with non-point source pollution and residuals from past industrial waste disposal practices) to contravention of the dissolved oxygen standard, continued water quality impairment associated with these standards would subject the County to continued enforcement efforts by NYSDEC and USEPA.

For these reasons, the "no action" alternative is not considered to be a viable solution to the wastewater treatment needs of the METRO service area.

3.3 PHASED TMDL STRATEGY FOR METRO IMPROVEMENTS

A. **Phosphorus and Ammonia Cap.** NYSDEC has proposed modifications to the SPDES discharge permit for METRO which would establish an immediate cap on effluent phosphorus and ammonia mass loadings discharged to Onondaga Lake.

For phosphorus, a maximum 12-month rolling average limit of 400 lb per day has been established based on a statistical analysis of METRO effluent phosphorus loading data for the period of January 1990 through February 1995. At the permitted 12-month rolling average flow limit of 80 mgd, the phosphorus cap is equivalent to an effluent phosphorus concentration of 0.6 mg/l -- significantly lower than the current maximum 30-day average limit of 1.0 mg/l. This phosphorus "cap" is consistent with the NYSDEC policy (TOGS 1.3.6, dated December 8, 1988) pertaining to phosphorus removal requirements for wastewater discharges to lakes and lake watersheds. This policy, which is being implemented across New York State, requires that there be no increase in the annual mass loading of phosphorus discharged from existing wastewater treatment facilities that require expansion of flow capacity.

For ammonia, a maximum 30-day average limit of 15,200 lb per day has been developed based on a statistical analysis of METRO effluent ammonia loadings recorded for the period of January 1990 through February 1995. The current METRO SPDES permit does not contain an effluent limit for ammonia. Establishment of the ammonia cap will prevent further contravention of water quality standards for ammonia in Onondaga Lake.

B. Interim METRO Improvements.

1. **Goals and Objectives.** The principal goal of the interim METRO improvements proposed by Onondaga County is to optimize METRO performance for further reduction of phosphorus and ammonia loadings using existing process tankage. METRO plant performance will be optimized by taking advantage of influent wastewater loading reductions resulting from the court-ordered implementation of industrial wastewater pretreatment by Bristol-Myers Squibb, and by implementing a series of capital projects and operational changes at METRO. Phosphorus and ammonia loading reductions accomplished during this phase will be captured by modification of the SPDES discharge permit.

2. **Description of Proposed Actions.**

a. **METRO Operating Changes.** Onondaga County plans to take advantage of the projected influent loading reductions resulting from industrial wastewater pretreatment by Bristol-Myers Squibb to alter METRO operating and maintenance strategies so as to maximize ammonia removal capabilities to the greatest extent possible with existing aeration and secondary clarifier tankage. In addition to the operating and process control changes that were implemented as a result of the Comprehensive Plant Evaluation discussed in Chapter 1, the County will begin to implement the following actions on or before the December 1996 deadline for startup of the Bristol-Myers Squibb pretreatment system:

1) **Plant Influent Monitoring.**

a) Closely monitor the addition of iron salts to the collection system (for odor control) so as to identify impacts on plant performance (i.e., phosphorus removal, sludge quantities and dewatering characteristics, pH changes, etc.).

b) Continue pretreatment program efforts to monitor industrial sources including Bristol-Myers Squibb.

c) Continue daily monitoring of influent pH and pollutant loadings.

d) Modify operational responses to accidental discharges from industrial users or changes in influent strength so as to maintain nitrification.

e) Investigate nutrient loading contributions from outside sources of County-hauled sludges and evaluate alternative disposal locations if significant.

f) Complete an investigation initiated in 1995 to track down the sources of mercury discharges to METRO. Based on the results of the initial investigations, the County will determine what further efforts are necessary to identify mercury sources and pursue source reduction efforts.

2) **Primary Settling.**

a) Monitor primary effluent pH and alkalinity to identify any limitations for nitrification performance.

b) Increase primary effluent monitoring frequency for BOD_5, suspended solids, phosphorus, and ammonia from five days per week to seven days per week.

3) **Activated Sludge Aeration.**

a) Continue periodic inspection of aeration tank feed weir elevations and adjust as necessary to maintain equal flow distribution to all tanks.

b) Adjust mean cell residence time (MCRT) to maximize growth of nitrifying microorganisms within the constraints of secondary clarifier solids settling limitations.

c) Increase aeration tank dissolved oxygen monitoring and adjust aerator operating speed as necessary to maintain proper conditions for nitrification.

d) Increase monitoring of aeration tank mixed liquor for identification of filamentous microorganism growth and develop and implement strategies for control if present.

e) Evaluate return sludge rates to determine proper operating conditions for nitrification.

4) **Secondary Settling.**

a) Increase monitoring frequency for determination of optimum clarifier sludge blanket levels. Process control adjustments may be necessary if excessive solids washout is encountered as a result of secondary clarifier design limitations.

b) Activate ducking skimmer mechanisms as necessary to remove scum accumulations. Process control adjustments may be necessary if heavy scum accumulations cause excessive odor problems or result in mechanical failure of equipment due to freezing.

c) Continue periodic inspection of clarifier weir elevations and level as necessary to avoid hydraulic short-circuiting.

d) Increase frequency of secondary clarifier effluent monitoring for BOD and ammonia from five days per week to seven days per week.

e) Initiate monitoring of secondary clarifier effluent for nitrate, nitrite, and alkalinity.

5) **Secondary Effluent Chlorination.**

a) Increase chlorine residual monitoring and make adjustments to chlorine feed rates in response to chlorine demands.

6) **Tertiary Settling.**

a) Continue operation of tertiary clarifiers for capture of solids washout from secondary clarifiers.

7) **Sludge Thickening, Stabilization, and Dewatering**

a) Optimize sludge thickening, anaerobic digestion, and belt press dewatering operations so as to minimize impacts on influent loadings from thickener overflow and belt press filtrate.

b) Increase monitoring of thickener sludge blanket levels and adjust thickened sludge pumping rates and belt press dewatering operations as necessary. Process control adjustments may be necessary if floating sludge causes excessive odor problems.

8) **Process Control.**

a) Adjust operational logs to accept additional data required for monitoring and control of nitrification performance.

b) Continue generation of plant flow and pollutant mass balances to aid in decision making regarding changes in operating strategies and/or adjustments to planned intermediate or long-term projects (e.g., for treatment or diversion of sludge sidestreams).

c) Continue the use of operating logs to aid in operational and process control decisions for sludge thickening, anaerobic digestion, and belt press dewatering systems.

b. **METRO Digital System Improvements.** Optimization of the METRO plant for ammonia removal will require additional process monitoring and the generation of additional operational data. The more readily available this information is, the better the plant staff will be able to operate and control the activated sludge system so as to produce the best effluent quality possible.

The existing METRO digital system is outdated and does not have the capacity for expansion. A new computer system is required to expand process monitoring and control capabilities. The County is in the initial stages of preparing a request for proposals to solicit and select a company to perform a turnkey operation associated with this project. Funding for this project will need to be obtained from the County Legislature. The cost for replacement of the METRO digital system is presently estimated at $2.9 million.

c. **Residuals Handling and Odor Control Improvements.** The County has retained O'Brien & Gere Engineers to provide professional engineering services in connection with the design, bidding, construction, and startup of residuals handling and odor control improvements. The scope of this project resulted from recommendations generated from the June 1992 report by Bowker & Associates, Inc. entitled "Survey of Odor Emissions and Evaluation of Odor Control Alternatives for the Metropolitan Syracuse WWTP" and the follow-up report by Blasland, Bouck & Lee, Inc. entitled "Comprehensive Odor Control System for Metropolitan Syracuse Sewage Treatment Plant" (August 1994). Specific improvements are summarized as follows:

1) Modifications to grit collection and removal systems installed in both the existing and new screening and grit buildings.

2) Upgrading of the new screening and grit building for receiving and dewatering screenings generated at METRO as well as at other County wastewater treatment plants and pumping stations.

3) Construction of a new waste hauler receiving station designed to minimize odors.

4) Construction of a centralized odor treatment system for emissions generated at the primary clarifiers and the existing and new screening and grit buildings. Covers will be installed at the primary clarifier influent distribution structures, the

primary clarifier effluent launders, and exposed wastewater channels in the existing and new screening and grit buildings. These areas will be ventilated to a fine mist scrubber system with sodium hypochlorite addition.

The County has obtained an appropriation from the Onondaga County Legislature to initiate this project. However, an increase in the amount of the authorization will be required in order to construct the project, which is presently estimated at $7.5 million.

d. **Digester Modifications and Mechanical Sludge Thickening Improvements.** The intent of the project is to improve sludge stabilization and dewaterability as well as to provide flexibility in digester operation. The County has retained the services of O'Brien & Gere Engineers in connection with the preliminary design of modifications necessary to convert the existing secondary digester (Digester No. 4) to a primary digester. This work includes the installation of auxiliary equipment for heating and mixing of the digester.

In connection with this work, the County has requested that O'Brien & Gere evaluate the need for mechanical sludge thickening in anticipation of operation for ammonia removal. Operation for ammonia removal is expected to result in poorer sludge thickening characteristics, which may adversely impact gravity sludge thickening performance.

The County has obtained an appropriation from the Onondaga County Legislature for the preliminary design of this project. An additional authorization will be necessary to proceed with final design, bidding, and construction. At present, the project cost is estimated at $6.2 million.

e. **Other Plant Improvements.** Onondaga County has retained the services of O'Brien & Gere Engineers in connection with the design, bidding, construction, and startup of plant improvements necessary to correct design deficiencies, improve worker safety, and replace or repair deteriorated equipment. These plant improvements include:

1) The installation of perimeter handrails to the floating cover of Digester No. 4 and to the fixed covers of Digester Nos. 1 and 2 in order to improve worker safety.

2) The replacement of three existing digester waste gas burners and the installation of a fourth waste gas burner. The new units will be equipped with automatic ignition systems for improved worker safety (existing units are ignited manually). An additional waste gas burner is necessary to handle increased digester gas production, which has resulted from the improvements to digester mixing systems.

3) Upgrading of ventilation systems serving the digester control house to reduce excessive heat gain resulting from operating equipment.

4) Pipeline modifications that would allow the County to close off and abandon an unused section of tertiary force main that is in danger of rupturing due to deterioration caused by hydrogen sulfide.

5) Remediation of groundwater infiltration into the main gallery, which is responsible for the deterioration of structural steel supports for gallery walkway grating and process piping. Structural steel supports will be replaced or repaired as necessary.

6) Replacement or repair of the existing screenings and grit building diversion gate and operator. The gate, which is presently inoperable, is used to isolate the existing screening and grit building for maintenance and operating flexibility.

7) Modifications to provide a means for isolating the tertiary pump station wet well for maintenance without requiring a complete bypass of secondary treatment facilities.

In addition to the above, the County has requested that several modifications be incorporated into the project. These include:

1) Modifications to the chlorination system to provide the ability to chlorinate the return activated sludge for control of filamentous microorganisms.

2) Addition of instrumentation to improve process monitoring and control.

3) Insulation and re-roofing of Primary Digester Nos. 1 and 3.

4) Improvements to the cover structure for the influent diversion chamber.

5) Addition of fall protection for a ladder located on the roof of the digester control house.

6) Addition of variable frequency drive controls for the roof-mounted exhauster for the digester control house.

The total cost for implementation of these improvements is estimated at $1.44 million.

f. **Permanent Phosphorus Removal Facilities.** Phosphorus removal at METRO is presently accomplished by chemical precipitation using temporary chemical storage and feed equipment that was installed in the sludge recycle buildings in 1986 following the announced closure of the AlliedSignal Corporation. Replacement of these temporary facilities will be necessary for compliance with New York State bulk chemical storage regulations. These regulations require the installation of secondary containment systems for existing above-ground chemical storage tanks by December 22, 1999.

Permanent phosphorus removal facilities will provide flexibility for the use of alternate chemicals (ferric chloride, ferrous chloride, ferrous sulfate, and alum) and alternate chemical feed points (single or dual-point addition to primary settling, secondary treatment, or tertiary treatment facilities). This flexibility will provide the plant staff with the opportunity to minimize operating costs by using the most economical combination of chemicals and feedpoints.

The project cost for constructing permanent phosphorus removal facilities at METRO is presently estimated at $2.4 million.

3. **Projected Impacts on METRO Performance.** The impact of the interim actions described in Section 3.2B.2 on METRO effluent phosphorus and ammonia loadings discharged to Onondaga Lake is difficult to predict accurately at this time. In theory, the reduction of METRO influent pollutant loadings that is expected to occur following the implementation of industrial wastewater pretreatment by Bristol-Myers Squibb should result in an increase in the magnitude and duration of incidental nitrification at METRO. However, secondary clarifier tankage and return sludge pumping capacity may limit the extent to which nitrification and activated sludge system performance can be controlled.

An important factor to consider in the design and operation of activated sludge treatment systems for ammonia removal is the impact of nitrification on activated sludge settling. Current municipal wastewater treatment plant design standards recognize that nitrification has the following impacts on activated sludge settling.

- Secondary clarifier hydraulic and solids loading rates are lower for nitrification than for BOD removal only.
- Secondary clarifier sidewater depth requirements are greater for nitrification than for BOD removal only.
- Activated sludge return sludge pumping capacity requirements are greater for activated sludge systems designed for nitrification than for BOD removal only.

In Ten-State Standards, peak secondary clarifier surface overflow rates are reduced from 1,200 gallons per day per square foot for systems designed for BOD removal only to 1,000 gallons per day per square foot for systems designed for single-stage nitrification. Similarly, peak secondary clarifier solids loading rates are reduced from 50 lb per day per square foot for BOD removal to 35 lb per day per square foot for nitrification. In other words, the hydraulic and solids loading capacities of secondary clarifiers designed for BOD removal are derated by approximately 17 percent and 30 percent, respectively, when converted for use in nitrification systems.

Ten-State Standards also specifies minimum sidewater depth of 12 feet for secondary clarifiers and recommends greater depths for clarifiers having surface areas in excess of 4,000 square feet and for clarifiers used in nitrification systems. The WEF Manual of Practice No. 8 recommends a minimum sidewater depth of 14 feet for secondary clarifiers having a diameter of greater than 140 square feet and suggests that the design hydraulic overflow rate be reduced by 100 gallons per day per square foot for each foot of depth less than this minimum. In the case of METRO where secondary clarifier diameter is 170 feet and sidewater depth is only 11 feet, this would reduce the design peak surface overflow rate from 1,000 gallons per day per square foot to 700 gallons per day per square foot. On this basis, the existing secondary clarifiers at METRO would be rated for a peak flow capacity of only 63.5 mgd -- well below both the required peak flow capacity of 126.3 mgd through full treatment required by the SPDES permit, as well as the design average daily flow capacity of 84.2 mgd.

Due to the limitations of secondary clarifier surface area and sidewater depth, control of excessive solids washout is expected to be a significant concern for the control of nitrification and activated sludge system performance. The control of solids washout is also expected to be impacted by limitations on return sludge pumping capacity. Existing return sludge pumps are capable of pumping 80 mgd, or 95 percent of the design average daily sewage flow. In comparison, Ten-State Standards requires that return sludge pumping systems be designed to provide capacity for 150 percent of the design average daily flow, or 120 mgd in the case of METRO.

If excessive solids washout cannot be controlled, it may be necessary for the METRO plant staff to make process control decisions to limit the extent of nitrification so as to avoid non-compliance with SPDES permit effluent limitations for $CBOD_5$, suspended solids, and phosphorus. Efforts will be made to avoid this situation, if at all possible, by optimizing the operation and performance of the existing tertiary clarifiers.

C. **Hypolimnetic Oxygenation for Onondaga Lake.** Onondaga County will conduct a demonstration project, with monetary assistance and oversight by the USEPA, to assess the technical feasibility and determine the costs and environmental impacts associated with oxygenation of the hypolimnion of Onondaga Lake. Based on discussions with USEPA representatives, hypolimnetic oxygenation has been suggested as a means of improving dissolved oxygen conditions in Onondaga Lake at relatively low cost.

A conceptual design for a hypolimnetic oxygenation system has been developed for Onondaga Lake by the U.S. Army Corps of Engineers in consultation with the Union Carbide Linde Division Tarrytown Technical Center. As described in the March 1992 Technical Report prepared by the U.S. Army Corps of Engineers Buffalo District, the conceptual design involves the direct injection of pure oxygen into the hypolimnion of Onondaga Lake at two locations: one in the north basin of the lake, and the other in the south basin. Oxygen injection at each location would be accomplished using a cluster of 12 sparging rafts anchored approximately 1 or 2 feet above the lake bottom. Each sparging raft would measure approximately 8 feet long by 5-1/2 feet wide and consist of an outside frame constructed of 0.4 cm diameter PVC pipe. A number of fine bubble diffuser tubes having 20-micron holes would be mounted across the width of each sparging raft. Lines attached to the rafts with floats located approximately 10 feet below the lake surface would be used for lifting and lowering the sparging rafts for periodic cleaning and maintenance, as necessary. Each raft would be connected by flexible tubing to a pipeline extending from the lake shoreline. Liquid oxygen storage tanks located on shore would be used to furnish pure oxygen to the sparging rafts. A vaporizer would be provided to convert the liquid oxygen to a gas for delivery to the sparging rafts.

The U.S. Army Corps of Engineers estimated that the total oxygenation capacity needed is approximately 15 lb of oxygen per minute (7.5 lb of oxygen per minute to each basin). This capacity was determined based upon analysis of the rate of dissolved oxygen depletion in the hypolimnion at the onset of stratification. Existing monitoring data were used to determine the rate of dissolved oxygen depletion.

The goal of the conceptual design, as stated by the U.S. Army Corps of Engineers, was to supply oxygen to the hypolimnion without impacting lake stratification or disturbing lake sediments. It was intended that the hypolimnetic oxygenation system would be operated from April through October. First-year project costs, inclusive of capital, as well as annual operating and maintenance costs, were estimated by the USACOE at approximately $1.4 million. Subsequent annual operating and maintenance costs were estimated at $0.8 million per year.

Evaluation of the conceptual design and preliminary cost estimates developed by the USACOE for hypolimnetic oxygenation for Onondaga Lake has raised concerns about the technical feasibility, costs, and potential environmental impacts that will require further investigation. These concerns will serve as the basis for the scope of the demonstration project which will be conducted in conjunction with the METRO interim improvements.

The results of the demonstration project will be used to determine full-scale design criteria. Onondaga County's responsibility to participate in full-scale hypolimnetic oxygenation will be limited to the relative contribution of the METRO discharge to dissolved oxygen depletion in the hypolimnion. It is expected that funding for oxygen demand resulting from background water chemistry and residuals from past industrial waste disposal practices will come from other sources. Full-scale implementation of hypolimnetic oxygenation is anticipated to occur in conjunction with intermediate METRO improvements.

D. **Intermediate Phase METRO Improvements.**

1. **Goals and Objectives.** The goals and objectives of intermediate phase improvements proposed by Onondaga County for METRO address the issues of wastewater treatment capacity, ammonia removal and effluent dechlorination. In general, these issues are not impacted by long-term decisions on the extent of phosphorus removal required and the need for outfall relocation or flow diversion.

2. **Description of Proposed Actions.**

a. **Acquisition of Niagara Mohawk Property**. Onondaga County will pursue the acquisition of property presently owned by the Niagara Mohawk Power Corporation which the METRO plant site presently surrounds. Acquisition of this property will be necessary to provide space for the construction of additional process tankage necessary to upgrade the METRO plant. The cost of acquiring the Niagara Mohawk property is presently unknown.

b. **Relocation/Consolidation of Sewer Maintenance Group.** A portion of the sewer maintenance group presently operates out of the sewer maintenance building located on the METRO plant site. Relocation of this group to the Ley Creek pump station site where the remainder of the Sewer Maintenance Group is located will make additional land available for the construction of process tankage necessary for upgrading of the METRO plant.

To provide a central, consolidated headquarters for the Flow Control Division, the County proposes to renovate the former Ley Creek sewage treatment plant site in two phases. The first phase will involve demolition of process tankage and structures located at the site, except for the main building, which will be renovated for occupation by the Flow Control Division staff, and the new pump station complex. The process tankage and structures to be demolished have been out of service since 1980 and are in a state of disrepair and decay. The primary and secondary tanks, digester complex, pump houses grit buildings and galleries are crumbling, extensively weather-damaged, inoperable and unsafe. With the exceptions of the main building and the new pump station complex, the site is unsecured, unsafe, unsightly, and vermin infested.

The second phase of the project involves renovation of the fire protection system for the site with loop supply piping and an adequate number of hydrants. Fire protection for the existing site is inadequate since only one working hydrant presently exists. There are nine other non-working hydrants located near the components of the old treatment plant and no hydrants near the new pump station complex.

The total cost for this project is presently estimated at $5.8 million.

c. **One-Quarter Plant Upgrade/Ammonia Removal Demonstration.** The existing METRO sewage treatment plant was designed with four activated sludge treatment systems which are operated in parallel. Each system consists of two aeration tanks and one secondary clarifier and may be operated either as a conventional complete mix activated sludge system or as a contact stabilization activated sludge system. These facilities were designed based on an average daily sewage flow of 80 mgd. Peak wastewater flow to the aeration tanks is restricted to 120 mgd by an overflow structure which is activated under wet weather conditions.

The aeration tanks measure 100 feet by 130 feet and operate at a sidewater depth of 14.2 feet. The total aeration volume of approximately 11 million gallons results in a hydraulic retention time of approximately 3.3 hours under design average daily flow conditions (80 mgd) and 2.2 hours under peak flow conditions (120 mgd). Each tank is equipped with six 100 horsepower, two-speed, mechanical surface aerators which have been in operation for more than 15 years and which are no longer manufactured or serviced by the original manufacturer.

The secondary clarifiers were constructed as 170-foot square units and operate at a sidewater depth of 11 feet. The clarifiers were recently modified to fill in the corners and may now be thought of as 170-foot diameter units. The purpose of the corner modifications was to reduce the adverse impacts of floating sludge and scum accumulations on clarifier performance.

Six return sludge pumps are provided for recycle of activated sludge from the secondary clarifiers to the aeration tanks. Two of the units serve as standby units in the event that emergency or planned preventative maintenance is needed. Each pump is rated for 13,800 gpm and is equipped with a variable frequency drive to vary the pump output. Total return sludge capacity with four units in operation is approximately 80 mgd, or 100 percent of the plant design flow.

The County proposes to construct additions and modifications to one quarter of METRO to enable a side-by-side demonstration of the performance capabilities and process reliability for year-round ammonia removal using conventional and advanced wastewater treatment technologies. Information obtained from the side-by-side demonstration will be used to select the appropriate technology and determine final design criteria for subsequent use in full-scale plant upgrading. The scope of the one-quarter plant upgrading includes the following:

1) The construction of one new 140-foot diameter secondary clarifier with associated sludge and scum removal equipment.

2) Structural modifications to two aeration tanks to convert from complete mix to plug flow with provisions for step feed capability.

3) The replacement of mechanical surface aerators with fine bubble diffused aeration equipment in the two modified aeration tanks, as well as the six unmodified aeration tanks.

4) The installation of Ringlace fixed-film media in one of the two modified aeration tanks.

Following construction of the one-quarter plant upgrade described above, the facilities will be operated for a period of 36 months during which performance monitoring and testing will be performed. Testing will be performed to examine the impacts of wet weather conditions on nitrification performance in activated sludge treatment systems with and without fixed-film media. The three years of testing will result in 24 months of monitoring data, which will be used to determine appropriate modification of the SPDES discharge permit limit for ammonia.

The results of the performance testing will be used to determine the ammonia removal capabilities of conventional activated sludge treatment, as well as the extent of fixed-film media needed to enhance ammonia removal for consistent compliance with the proposed SPDES permit effluent ammonia limits of 4 mg/l (as NH_3) for November through May and 2 mg/l (as NH_3) for June through October. Based upon the information obtained from the demonstration project, final design criteria will be determined for subsequent full-scale upgrade of the METRO plant.

The total project cost of the proposed one-quarter plant upgrade is estimated at \$32.7 million.

d. **Full-Scale Plant Upgrade.** At present, it is expected that full-scale upgrading of the METRO plant for year-round ammonia removal will require the use of fixed-film media to enhance nitrification in the existing aeration tanks. The scope of the full-scale upgrade is expected to include the following:

1) The construction of four new 140-diameter circular secondary clarifiers with associated sludge and scum collection and removal equipment. As discussed previously, one of the units will be constructed as part of the one-quarter plant upgrade.

2) Structural modifications to the existing aeration tanks to convert from complete mix to plug flow with provisions for step feed.

3) The installation of fixed-film media and associated equipment in the existing aeration tanks.

4) The construction of additional process tankage and modification of existing tankage for chlorination and dechlorination.

The total project cost of the proposed full-scale improvements is estimated at $73.8 million.

3. **Projected Impacts on METRO Performance.** The intermediate METRO improvements described above will have a significant impact on ammonia concentrations in Onondaga Lake. The improvements will accomplish year-round removal of ammonia at the METRO plant for compliance with maximum 30-day average effluent limits of 4 mg/l (as NH_3) for the period of November through May and 2 mg/l (as NH_3) for the period of June through October. It is projected that with these reductions, compliance with the ambient water quality standard for ammonia in Onondaga Lake may be possible. In addition, the proposed improvements will significantly reduce chlorine residual concentrations in the METRO effluent and in Onondaga Lake.

3.4 CONCEPTUAL LONG-TERM ALTERNATIVES

The interim and intermediate METRO improvements in combination with hypolimnetic oxygenation are intended to bring the METRO discharges into compliance with state requirements. The County has incorporated a monitoring and assessment program into its MCP, along with the METRO and CSO improvements. Based on the results of the monitoring and assessment program, additional actions may be required. This section provides discussion of conceptual long-term METRO alternatives that might be considered if additional actions are required.

The TMDL strategy will continue to provide the framework for assessing the need for additional actions. Criteria to evaluate the need for additional reductions in pollutant inputs to the lake will include the following consideration:

1. Assessment of the classification and use of the lake and its tributaries, and changes to ambient water quality standards.

2. Progress towards resolution of the NPL (lake sediment contamination) issues.

3. Availability of monitoring data and predictive modeling tools.

4. Assessment of sources of pollution, including an improved estimate of the relative magnitude of non-point source phosphorus loads,

5. Biological monitoring results indicating the presence and magnitude of toxic substances,

6. Species composition and diversity (phytoplankton, zooplankton, and fish)

7. Advances in treatment technologies.

8. Assessment of the condition of METRO

9. Affordability and cost/benefit of additional controls.

10. Assessment of legal and regulatory requirements.

11. Assimilative capacity of alternate receiving waters (e.g., status of zebra mussel impacts on the Seneca River).

Several long-term alternatives for METRO have been developed conceptually and include the following:

1. Upgrading of METRO to incorporate effluent filtration for "state-of-the-art" phosphorus removal.

2. Relocation of the METRO plant outfall for oxygenated deepwater discharge to the lake or for discharge to the Seneca River.

3. Reduction of influent wastewater flows by diversion to other County-owned wastewater treatment facilities either alone or in combination with effluent diversion.

The following sections provide a brief description of these conceptual long-term alternatives. Implementation of interim and intermediate improvements will not preclude future implementation of any of the long-term alternatives.

A. **Effluent Filtration for "State-of-the-Art" Phosphorus Removal.** The current practice of chemical addition at METRO constitutes the "Best Treatment Technology" (BTT) for phosphorus removal as defined in Technical and Operational Guidance Series (TOGS) 1.3.6, published by the NYSDEC Division of Water in reference to phosphorus removal requirements for wastewater discharges to lakes and lake watersheds. Treatment for phosphorus removal is presently accomplished at METRO by chemical precipitation using ferrous sulfate. Ferrous sulfate is added to the return activated sludge force mains for precipitation of phosphorus in the activated sludge treatment system. Ferrous chloride is also added at several points in the wastewater collection system for odor control. Based on the results of the phosphorus removal study, it appears that the addition of iron salts to the collection system for odor control also contributes to phosphorus removal at the METRO plant.

Monthly average METRO effluent phosphorus concentrations typically range from approximately 0.4 mg/l to 0.8 mg/l (Figure 1-11). Effluent phosphorus concentrations increase with increasing effluent suspended solids concentrations and increasing wastewater flows as presented in Figures 3-1 and 3-2, respectively. These relationships illustrate the importance of clarifier design on suspended solids capture and phosphorus removal.

The METRO phosphorus removal performance data is also consistent with data reported by USEPA for municipal wastewater treatment facilities located in the Chesapeake Bay drainage basin (USEPA, September 1987). The USEPA data indicate phosphorus removal performance capabilities for municipal wastewater treatment facilities utilizing activated sludge treatment systems as shown in Table 3-5.

Effluent phosphorus concentrations can be reduced to less than 0.2 mg/l with tertiary filtration. This represents the current "state-of-the-art" with respect to phosphorus removal for municipal wastewater treatment facilities. The cost of adding effluent filtration at METRO will be significant. Preliminary estimates indicate a project cost of approximately $70 million for tertiary filtration facilities. As discussed previously, current water quality model results indicate that compliance with the guidance value cannot be attained even with complete diversion of the METRO discharge.

B. METRO Outfall Relocation.

1. **Hypolimnetic Discharge to Onondaga Lake.** Relocation of the METRO outfall for discharge to the hypolimnion of Onondaga Lake was presented as an alternative in the April 1994 Draft MCP/DEIS submittal by Onondaga County to NYSDEC. Interest in this alternative developed in response to the 1993 discovery of adverse water quality impacts in the Seneca River caused by zebra mussels. The zebra mussel infestation depleted the available waste assimilative capacity in the river, resulting in the requirement for tertiary effluent filtration, at significant cost, for a river discharge.

Discharge of oxygenated METRO effluent to the hypolimnion of Onondaga Lake represents a potential means of avoiding further adverse impact on water quality in the Seneca River while improving water quality conditions in the lake. The principal concept of the alternative involves addressing the depletion of dissolved oxygen concentrations in the upper waters during fall turnover by providing oxic conditions in the hypolimnion during the period of lake stratification. Oxygen demand resulting from the accumulation of reduced species, such as hydrogen sulfide and methane, during the period of lake stratification is the cause of dissolved oxygen depletion in the upper waters of Onondaga Lake during fall turnover conditions. Relocation of the METRO discharge to the hypolimnion would reduce phosphorus and ammonia concentrations in the epilimnion.

2. **Discharge to the Seneca River.** Relocation of the METRO discharge from Onondaga Lake to the Seneca River is an alternative which was discussed in the draft MCP/DEIS document submitted to the NYSDEC by Onondaga County in April 1994. Diversion of the METRO discharge may be accomplished by conveyance of the METRO plant effluent to the Seneca River alone (i.e., "complete diversion") or in combination with the partial diversion of METRO influent to the Baldwinsville-Seneca Knolls wastewater treatment plant (i.e., "split total diversion").

The results of an evaluation performed by the NYSDEC indicated that the wastewater assimilative capacity of the Seneca River is adversely impacted by an infestation of zebra mussels located upstream of the Baldwinsville-Seneca Knolls wastewater treatment plant. As a result, NYSDEC has determined that an "oxygen neutral" discharge would be required for METRO to discharge to the river.

The term "oxygen neutral" has been defined by NYSDEC as the most stringent level of treatment required for a municipal wastewater treatment facility. In terms of permit limits for METRO effluent BOD_5, ammonia and dissolved oxygen, concentrations would be 5 mg/l, 2 mg/l, and 7 mg/l, respectively. In accordance with current SPDES permitting practices, the effluent limits for BOD_5 and ammonia would be imposed as daily maximum concentration limits and the effluent limit for dissolved oxygen would be imposed as a daily minimum concentration limit. These limits represent the maximum level of treatment which the NYSDEC imposes on municipal wastewater treatment facilities and are more stringent than the effluent limits presently provided for continued discharge to Onondaga Lake. Compliance with these limits would require additional facilities (beyond those proposed for intermediate improvements) for ammonia removal as well as effluent filtration for BOD_5 removal and post aeration to maintain effluent dissolved oxygen concentrations in compliance with the proposed permit limit.

With respect to phosphorus and chlorine residual, NYSDEC has indicated that effluent limitations of 1 mg/l and 0.1 mg/l, respectively, would be acceptable for discharge to the Seneca River. The 1 mg/l limit for phosphorus is based on the Great Lakes Water Quality Agreement and would be imposed as a maximum 30-day average concentration limit in accordance with current SPDES permitting practices. The 0.1 mg/l limit for chlorine residual represents the analytical detection limit for chlorine residual in wastewater effluent and is consistent with current SPDES permitting practices for situations where inadequate effluent dilution is available to establish a measurable effluent limitation based on the current ambient water quality standard (0.005 mg/l). Unlike BOD_5 and ammonia, the effluent limits for phosphorus and chlorine residual would not require any additional facilities at METRO beyond those proposed as intermediate improvements.

Conveyance of the METRO effluent to the Seneca River for discharge would require the construction of an effluent pump station at the METRO plant site and a force main extending approximately 33,500 feet (6.3 miles) from the METRO site to the Seneca River. This length is estimated for a pipeline routing along the eastern shoreline of the lake. The size of the force main would be dependent on the amount of flow to be conveyed. Preliminary sizing indicates the need for a 96-inch diameter force main to convey the peak effluent flow handled at METRO during wet weather. Reduced sizing may be possible if effluent flows above a certain base flow could be discharged to the lake.

Costs and environmental impacts of the effluent force main would be dependent on the routing chosen. Alternate routes which have been discussed include: (1) along the eastern shoreline of the lake; (2) along the western shoreline of the lake; and (3) through the lake via a pipeline installed on the lake bottom. A detailed evaluation of the costs and environmental impacts of these alternate pipeline routes should be performed if diversion of the METRO discharge to the Seneca River is required in the future.

C. **Influent Flow Diversion.** Diversion of a portion of the METRO influent raw sewage flow to another County-owned facility where site constraints for expansion were less severe was developed conceptually by Onondaga County as an alternative means of attaining compliance with water quality standards in Onondaga Lake. Based on preliminary water quality model results available in July 1992, the County developed the "partial diversion" alternative which entailed diversion of sewage flows from the Westside service area, along with a baseline flow of 28 mgd from METRO to the County's Baldwinsville-Seneca Knolls sewage treatment plant. This alternative reduced average daily flows influent to METRO by 38 mgd and peak flows by 56 mgd, thereby providing capacity for seasonal nitrification at the METRO plant without the need for expansion of process tankage. When subsequent model revisions indicated that year-round nitrification was required, the partial diversion alternative was modified to incorporate enhanced nitrification utilizing integrated fixed-film activated sludge technology at METRO. The alternative was further modified by the Director of the Onondaga Lake Management Conference, who suggested that the reduced effluent flow from METRO could be diverted to the Seneca River, resulting in "split total diversion."

The discovery of the adverse water quality impacts resulting from infestation of the Seneca River by zebra mussels in 1993 significantly impacted the technical and economic viability of these alternatives. Using the water quality model developed by UFI for the Seneca River, NYSDEC determined that tertiary effluent filtration would be necessary at both the Baldwinsville-Seneca Knolls and METRO facilities to produce an "oxygen-neutral" discharge to the river. As discussed previously with regard to "state-of-the-art" phosphorus removal, effluent filtration represents a significant additional cost impact of approximately $70 million. Remediation of the adverse water quality impact caused by the zebra mussels could avoid this potential expense.

3.5 MONITORING AND ASSESSMENT OF RECEIVING WATER IMPACTS

Included as a principle in the TMDL process is the need for monitoring changes in ambient water quality or biological conditions. USEPA notes that measuring environmental progress is a "critical need and has become a key element of the Agency's strategic planning process" (USEPA, April 1991, page 3). The effectiveness of METRO and CSO improvements and the need for additional controls beyond the interim and intermediate projects will be assessed through a long-term monitoring program of Onondaga Lake, the lake tributaries, and the Seneca River. Elements of "ecological integrity" will be measured. These indices include physical and habitat issues, chemical water quality, and biological parameters.

The focus of the long-term monitoring program is twofold: compliance with ambient water quality standards in the lake and tributaries, and progress towards resolution of the non-County habitat and contamination issues affecting restoration of the lake fishery. An outline of the monitoring program's objectives and the County's strategy for achieving the objectives is presented below. Summary tables detailing the proposed program (specific sites, monitoring frequencies, chemical and biological parameters to be monitored, analytical procedures and limits of detection etc.) are presented in Appendix C-4.

A. Tributary Monitoring Program.

1. Objectives.

a. Quantify external loading of phosphorus, suspended solids, indicator bacteria, heavy metals, and salts.

b. Gather data on an adequate temporal and spatial scale to partition point and non-point sources.

c. Assess compliance with ambient water quality standards.

d. Assess biological habitat in tributaries and measure improvements in response to CSO remedial measures.

e. Incorporate sufficient flexibility so that monitoring and assessment of additional chemicals or potential sources can be done as needed.

f. Share findings with regulatory agencies on a regular (quarterly) basis.

2. Strategy.

a. Define tributary monitoring as an internal priority at Department of Drainage and Sanitation; dedicate sufficient resources to enable necessary flexibility, responsiveness, and reporting requirements.

b. Increase participation of outside technical experts, such as the present County Lake Advisory Group, in the design and implementation of the monitoring program and the interpretation of results.

c. Continue cooperative arrangements with USGS to gauge flows in major lake tributaries.

d. Work with USGS and Crucible Specialty Metals to improve flow estimates (and therefore loading estimates) of Tributary 5A.

e. Utilize the software program FLUX to quantify external loads, calculate standard error of loading estimates, and continually refine the allocation of sampling resources to best estimate loads.

f. Shift monitoring from a scheduled to an event-based program as needed to minimize standard error of external load calculations. Guidance in allocation of sampling resources to be assessed using FLUX.

g. Collect storm event data both upstream and downstream of the CSO network on Onondaga Creek and Harbor Brook

h. Use the rapid field biotic index to assess changes to tributary macroinvertebrates

i. Utilize quality assurance/quality control procedures in the field and laboratory programs. Draw on guidance developed by NYSDEC and USEPA for use in documenting quality of data collected under state and federal hazardous waste programs.

B. Onondaga Lake Monitoring Program.

1. Objectives.

a. Assess compliance with ambient water quality standards, including bacteria concentrations in near-shore areas following storm events.

b. Assess trophic status of the lake.

c. Evaluate trends in lake water quality over time and in response to remedial actions

d. Complement the chemical monitoring program with biomonitoring to assess the densities and species composition of phytoplankton, zooplankton, macrophytes, macrobenthos, and fish.

e. Evaluate success of fish propagation (quantitative lakewide nest survey, estimation of recruitment, and juvenile community structure) in the lake on an annual basis

f. Establish data sharing protocols with the NYSDOH to enable the County to track contaminant burden in fish flesh.

g. Assess biological habitat in lake and monitor improvements in response to remedial measures.

h. Incorporate additional monitoring to test temporal and spatial variability (for example, diurnal variations in lake water quality)

i. Incorporate sufficient flexibility so that monitoring and assessment of additional chemicals or potential sources can be done as needed.

j. Share findings with regulatory agencies on a regular (quarterly) basis.

2. **Strategy.**

a. Define lake monitoring as an internal priority at the Department of Drainage and Sanitation; dedicate sufficient resources to enable necessary flexibility, responsiveness, and reporting requirements.

b. Increase participation of outside technical experts, such as the present County Lake Advisory Group, in the design and implementation of the monitoring program and the interpretation of results.

c. Structure monitoring program to collect data at the temporal and spatial scale required to assess compliance.

d. Utilize quality assurance/quality control procedures in the field and laboratory programs. Draw on guidance developed by NYSDEC and USEPA for use in documenting quality of data collected under state and federal hazardous waste programs.

C. River Monitoring Program.

1. Objectives.

a. Evaluate current water quality of the Seneca River upstream and downstream of the Onondaga Lake outlet

b. Evaluate compliance with ambient water quality standards

c. Evaluate the assimilative capacity of the Seneca River

d. Design monitoring to test temporal and spatial variability (for example, diurnal variations in river water quality, presence and extent of chemical stratification)

e. Incorporate sufficient flexibility so that monitoring and assessment of additional chemicals or potential sources can be done as needed.

f. Share findings with regulatory agencies on a regular basis.

2. Strategy.

a. Concentrate river monitoring during critical conditions of warm weather and low stream flows

b. Define river monitoring as an internal priority at the Department of Drainage and Sanitation; dedicate sufficient resources to enable necessary flexibility, responsiveness, and reporting requirements.

a program of cost-effective improvements that will lead to compliance with water quality standards established for the receiving waters.

The CSO abatement program is similar to the METRO recommended program in that it includes both interim and intermediate projects to address water quality problems. The first series of projects to be implemented includes both demonstration projects, the conclusions of which will be incorporated into subsequent projects and projects with a high benefit-to-cost ratio. These projects are categorized as "interim" and will be implemented between 1996 and 2000. The second series of projects, termed "intermediate," represent what will be needed to achieve substantial compliance with federal and state requirements defined below. The magnitude of expenditures in the intermediate phase requires that the program be spread over a number of years. Monitoring of Onondaga Lake and the three principal CSO-impacted tributaries, as described in Chapter 5, is an important aspect of the intermediate phase and will eventually dictate whether subsequent, or "long-term," abatement measures will be necessary to achieve water quality goals.

A. **Federal CSO Control Policy.** The U.S. Environmental Protection Agency (USEPA) issued a "Combined Sewer Overflow Control Policy" (the Policy) on April 19, 1994. The Policy established a national framework and guidance to communities and state/federal officials for controlling CSOs. The Policy calls for communities with CSOs to take early actions (defined herein as nine minimum controls [NMC]) and long-term actions (defined herein as interim plus intermediate actions) to address their CSOs. The Policy provides communities with the flexibility to develop a workable, cost-effective solution to this major environmental problem.

CSOs are considered "point sources" of pollution under the Clean Water Act (CWA). As such, permits must be issued to address CSOs. The Policy recognizes the site-specific nature of CSOs and their impacts, and provides the necessary flexibility to tailor controls to local situations. The Policy was established as guidance so that it could be incorporated into state strategies.

The Policy requires early implementation of NMC. If these minimum controls prove to be inadequate to meet water quality requirements, then additional (long-term) measures are required. The extent to which a municipal compliance plan may meet water quality requirements is based upon either the "presumption" or "demonstration" approach as described later in this chapter.

TABLE 3-1

DESIGN AVERAGE DAILY FLOWS AND LOADINGS[1]
Municipal Compliance Plan
Onondaga County, New York

	FLOW (MGD)	BOD_5		TSS		TP		TKN		AMMONIA	
		MG/L	LBS/DAY	MG/L	LBS/DAY	MG/L	LBS/DAY	MG/L	LBS/DAY	MG/L	LBS/DAY
Current conditions	78.6	200	130,000	210	140,000	4.3	2,800	35.0	23,000	20.0	13,000
Bristol pretreatment[2]	--	--	-43,000	--	-22,900	--	-350	--	-5,950	--	-1,690
CSO abatement	1.6	69	940	754	10,300	1.6	20	8.2	110	2.0	30
Future growth	4.0	220	7,300	220	7,300	6.0	200	40.0	1,300	25.0	830
Design Capacity	84.2	136	95,240	192	134,700	3.8	2,670	26.3	18,460	17.3	12,170

(1) Flows and loadings represent 12-month average conditions.
(2) Reductions shown are based on compliance with tentative final effluent limits for the Bristol-Myers Squibb wastewater pretreatment facility.

TABLE 3-2

PROPOSED INTERIM AND FINAL EFFLUENT LIMITS
FOR BRISTOL-MYERS SQUIBB DISCHARGE
Municipal Compliance Plan
Onondaga County, New York

	INTERIM LIMITS	FINAL LIMITS
BOD_5	300 mg/l	300 mg/l
Suspended solids	300 mg/l	300 mg/l
Total phosphorus	40 mg/l	20 mg/l
TKN	100 mg/l	40 mg/l
Ammonia (as N)	60 mg/l	25 mg/l
Total solvents	50 mg/l	10 mg/l
Any single solvent	5 mg/l	1 mg/l

TABLE 3-3

PROJECTED POLLUTANT LOADING REDUCTIONS
RESULTING FROM BRISTOL PRETREATMENT
Municipal Compliance Plan
Onondaga County, New York

	CURRENT CONDITIONS*	PRETREATED DISCHARGE (INTERIM/FINAL)	LOADING REDUCTION
Flow, mgd	1.3	1.3	--
BOD_5, mg/l BOD_5, lbs/day	4,270 46,300	300/300 3,300/3,300	-- 43,000/43,000
TSS, mg/l TSS, lbs/day	2,420 26,200	300/300 3,300/3,300	-- 22,900/22,900
TP, mg/l TP, lbs/day	52 570	40/20 430/220	-- 140/350
TKN, mg/l TKN, lbs/day	588 6,380	100/40 1,080/430	-- 5,300/5,950
Ammonia N, mg/l Ammonia N, lbs/day	181 1,960	60/25 650/270	-- 1,310/1,690

*Based on 1992 monitoring data.

TABLE 3-4

PROJECTED AVERAGE DAILY FLOWS AND LOADINGS
FROM CSO ABATEMENT FACILITIES
Municipal Compliance Plan
Onondaga County, New York

	FLOW (MGD)	BOD_5 (LBS/DAY)	TSS (LBS/DAY)	TP (LBS/DAY)	TKN (LBS/DAY)	AMMONIA-N (LBS/DAY)
January	0.23	134	1,480	3.1	16	4
February	0.37	209	2,300	4.8	25	6
March	0.55	313	3,450	7.1	37	9
April	1.29	735	8,090	16.7	87	21
May	1.53	876	9,630	19.9	104	25
June	3.06	1,750	19,270	39.9	208	51
July	3.72	2,130	23,400	48.5	253	62
August	3.15	1,800	19,820	41.0	214	52
September	2.92	1,670	18,370	38.0	199	48
October	1.26	718	7,900	16.4	85	21
November	1.06	606	6,670	13.8	72	18
December	0.53	300	3,300	6.8	36	9
Annual Average	1.64	940	10,340	21.4	112	27

Source: Moffa & Associates (Chapter 4, Section 4.1.B2 of the DEIS).

TABLE 3-5

TYPICAL PHOSPHORUS REMOVAL PERFORMANCE CAPABILITIES
FOR MUNICIPAL WASTEWATER TREATMENT FACILITIES
UTILIZING ACTIVATED SLUDGE TREATMENT SYSTEMS
Municipal Compliance Plan
Onondaga County, New York

EFFLUENT TP (MG/L)	CHEMICAL DOSAGE M^{3+}/INFLUENT TP (MOLAR RATIO)	POLYMER DOSAGE (MG/L)	PEAK CLARIFIER SURFACE OVERFLOW RATE (GPD/SF)	EFFLUENT FILTRATION REQUIRED?
2.0	1.0 - 1.2	0.1 - 0.2	800	No
1.0	1.2 - 1.5	0.1 - 0.2	600	No
0.5	1.5 - 2.0	0.1 - 0.2	500	Maybe
0.2	3.5 - 6.0	0.5 - 1.0	500	Yes

Source: USEPA, "Handbook - Retrofitting POTWs for Phosphorus Removal in the Chespeake Bay Drainage Basin," USEPA, Office of Research and Development, Water Engineering Research Laboratory, Center for Environmental Research Information, EPA/625/6-87/017, September 1987.

Section Four

CHAPTER 4 - DEVELOPMENT AND EVALUATION OF CSO ABATEMENT ALTERNATIVES
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CHAPTER 4

DEVELOPMENT AND EVALUATION OF CSO ABATEMENT PROGRAM

4.0 GENERAL

Combined sewer overflows are a remnant of the Country's early infrastructure. In the past, cities built sewer systems to collect both stormwater and sanitary wastewater in the same sewer, called a "combined sewer." During dry weather, combined sewers carry wastewater to treatment facilities. When it rains, however, combined sewers may not have the capacity to carry all the stormwater and wastewater, or the treatment plant may not be large enough to treat all of the combined flow. In these situations, some of the combined wastewater and stormwater overflows untreated into the nearest body of water (stream, lake, river, or estuary), creating a combined sewer overflow. These CSOs pose risks to human health and the environment.

Since CSOs are a mixture of raw sewage, commercial and industrial wastes, and stormwater runoff, many different types of pollutants may be present. The main constituents of CSOs are untreated human and industrial wastes, potentially toxic materials like oil and pesticides, and floating debris washed into the sewer system through street runoff and storm drains.

Many alternatives for the abatement of CSO discharges have been considered for the Syracuse combined sewer system during recent years (CSO Facilities Plan, 1991, and Appendix C-2). The more cost-effective recommendations involving minimal structural improvements have already been implemented; significant reductions in magnitude and frequency of CSO events have resulted. The decision on appropriate actions to implement final CSO controls has been delayed until now, because the efficacy of controls, emerging regulatory requirements, and ability of Onondaga County to fund such improvements in the absence of any substantial state or federal assistance programs were under evaluation. The program proposed herein reflects the most cost-effective manner for Onondaga County to achieve compliance with the goals of the New York State CSO Control Strategy (Appendix C-6) and the federal CSO Control Policy (Appendix C-7), which have been developed and formally adopted only in the last few years. The objective of this MCP is to structure a program of cost-effective improvements that will lead to compliance with water quality standards established for the receiving waters.

The CSO abatement program is similar to the METRO recommended program in that it includes both interim and intermediate projects to address water quality problems. The first series of projects to be implemented includes both demonstration projects, the conclusions of which will be incorporated into subsequent projects and projects with a high benefit-to-cost ratio. These projects are categorized as "interim" and will be implemented between 1996 and 2000. The second series of projects, termed "intermediate," represent what will be needed to achieve substantial compliance with federal and state requirements defined below. The magnitude of expenditures in the intermediate phase requires that the program be spread over a number of years. Monitoring of Onondaga Lake and the three principal CSO-impacted tributaries, as described in Chapter 5, is an important aspect of the intermediate phase and will eventually dictate whether subsequent, or "long-term," abatement measures will be necessary to achieve water quality goals.

A. **Federal CSO Control Policy.** The U.S. Environmental Protection Agency (USEPA) issued a "Combined Sewer Overflow Control Policy" (the Policy) on April 19, 1994. The Policy established a national framework and guidance to communities and state/federal officials for controlling CSOs. The Policy calls for communities with CSOs to take early actions (defined herein as nine minimum controls [NMC]) and long-term actions (defined herein as interim plus intermediate actions) to address their CSOs. The Policy provides communities with the flexibility to develop a workable, cost-effective solution to this major environmental problem.

CSOs are considered "point sources" of pollution under the Clean Water Act (CWA). As such, permits must be issued to address CSOs. The Policy recognizes the site-specific nature of CSOs and their impacts, and provides the necessary flexibility to tailor controls to local situations. The Policy was established as guidance so that it could be incorporated into state strategies.

The Policy requires early implementation of NMC. If these minimum controls prove to be inadequate to meet water quality requirements, then additional (long-term) measures are required. The extent to which a municipal compliance plan may meet water quality requirements is based upon either the "presumption" or "demonstration" approach as described later in this chapter.

1. **Minimum Control Measures.** The NMC are controls that can reduce CSOs and their effects on receiving waters, as determined on a best professional judgement (BPJ) basis by the NPDES/SPDES permitting authority. The NMC do not require significant engineering studies or major construction, and can be implemented over a relatively short time period.

The NMC are as follows:

a. Proper operation and regular maintenance programs for the sewer system and CSO outfalls.

b. Maximum use of the collection system for storage.

c. Review and modification of pretreatment requirements to ensure that CSO impacts are minimized.

d. Maximization of flow to the publicly owned treatment works (POTW) for treatment.

e. Elimination of CSOs during dry weather.

f. Control of solid and floatable materials in CSOs.

g. Pollution prevention programs to reduce contaminants in CSOs.

h. Public notification to ensure adequate awareness of CSO occurrences and CSO impacts.

i. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

2. **Long-Term Control Plan (LTCP).** Four key principles of the Policy ensure that CSO controls are cost effective and meet the objectives of the CWA. The NPDES permitting authorities are directed to:

a. Provide clear levels of control that would be presumed to meet appropriate health and environmental objectives.

b. Provide sufficient flexibility to municipalities, especially financially disadvantaged communities, to consider the site-specific nature of CSOs and to determine the most cost-effective means of reducing pollutants and meeting CWA objectives and requirements.

c. Allow a phased approach to implementation of CSO controls that reflects a community's financial capability.

d. Review and revise, as appropriate, water quality standards and their implementation procedures when developing CSO control plans to reflect the site-specific wet weather impacts of CSOs.

The CSO Policy further lists nine elements that should be addressed. As listed in the Policy, the nine elements of the LTCP are:

a. Characterization, monitoring, and modeling activities as the basis for selection and design of effective CSO controls.

b. A public participation process that actively involves the affected public in the decision making to select long-term CSO controls.

c. Consideration of sensitive areas as the highest priority for controlling overflows.

d. Evaluation of alternatives that will enable the permittee, in consultation with the NPDES permitting authority, water quality standards, WQS authority (if different from the permitting authority), and the public to select CSO controls that will meet CWA requirements.

e. Cost/performance considerations to demonstrate the relationships among a comprehensive set of reasonable control alternatives.

f. Operational plan revisions to include agreed-upon long-term CSO controls.

g. Maximization of treatment at the existing POTW treatment plant for wet weather flows.

h. An implementation schedule for CSO controls.

i. A post-construction compliance monitoring program adequate to verify compliance with water-quality-based CWA requirements and ascertain the effectiveness of CSO controls.

3. **Presumption Versus Demonstration Approach.** The degree to which proposed facilities meet the objectives of the USEPA's Policy is based on one of two approaches used to determine whether a control program is adequate to meet the water quality-based requirements of the CWA.

a. **Presumption Approach.** The Policy states:

> "A program that meets any of the criteria listed below would be presumed to provide an adequate level of control to meet the water quality requirements of the CWA, provided the permitting authority determines that such presumption is reasonable in light of the data and analysis conducted and the characterization, monitoring, and modeling of the system and the consideration of the sensitive areas described above. These criteria are provided because data and modeling of wet weather events often do not give a clear picture of the level of CSO controls necessary to protect WQS." Appendix C-7, page 5.

Under the Presumption Approach, at least one of the following criteria must be met:

i) No more than an average of four overflow events per year, although the permitting authority may allow up to two additional overflow events per year; or

ii) The elimination or the capture for treatment of no less than 85 percent by volume of the combined sewage collected in the CSS during precipitation events on a system-wide annual average basis; or

iii) The elimination or removal of no less than the mass of the pollutants identified as causing water quality impairment through sewer system characterization, monitoring, and modeling effort for the volumes that would be eliminated or captured for treatment under ii)."

The Presumption Approach provides a regulatory agency, such as NYSDEC, with the ability to proceed with approval of control measures before sufficient data on actual water quality impacts have been gathered to the satisfaction of all parties involved.

b. **Demonstration Approach.** A permittee may demonstrate that a selected control program, although not meeting the criteria specified in the Presumption Approach, is adequate to meet the water quality-based requirements of the CWA. To be a successful demonstration, the permittee should demonstrate each of the following:

"1. The planned control program is adequate to meet WQS and protect designated uses, unless WQS or uses cannot be met as a result of natural background conditions or pollution sources other than CSOs.

2. The CSO discharges remaining after implementation of planned control program will not preclude the attainment of WQS or the receiving waters' designated uses or contribute to their impairment. Where WQS and designated uses are not met in part because of natural background conditions or pollution sources other than CSOs, a total maximum daily load, including a waste load allocation and a load allocation, or other means should be used to apportion pollutant loads.

3. The planned control program will provide the maximum pollution reduction benefits reasonably attainable; and

4. The planned control program is designed to allow cost effective expansion or cost effective retrofitting if additional controls are subsequently determined to be necessary to meet WQS or designated uses." (Federal Policy, page 6, Appendix C-7)

B. **New York State CSO Control Strategy.** In anticipation of the federal guidance, the NYSDEC published Technical Operation Guidance Series (TOGS) 1.6.3 *Combined Sewer Overflow Control Strategy* on October 1, 1993 (Appendix C-6). New York State intends to make subsequent modifications to its policy to reflect the final federal Policy; however, these modifications are not expected to influence the selection of projects described in the MCP, since federal guidance has been incorporated.

1. **Minimum BMP Measures.** New York State developed new SPDES CSO best management practices that largely conform with the NMC measures contained in the federal policy. They are:

a. CSO maintenance/inspection
b. Maximum use of the collection system for storage
c. Industrial pretreatment
d. Maximize flow to the POTW
e. Prohibition of dry weather overflow
f. Control of floatable and settleable solids
g. Combined sewer replacement
h. Combined sewer extension
i. Connection prohibition
j. Capacity assurance program
k. Septage and hauled waste
l. Control of runoff
m. Notification of CSO locations.

2. **Additional Control Measures.** The state's strategy identifies the need for "additional" control measures as follows:

> "If the minimum BMP practices listed above will not remove the CSO from the PWP (Priority Water Problem) as a contributing factor to a precluded, impaired, stressed or threatened best use of the receiving water, additional control measures shall be required. In general, this will require the development of a comprehensive facility plan that studies the collection system, treatment facilities, and receiving water quality. The facility plan must identify final control measures and include an implementation schedule." (Appendix C-6, page 11)

Although BMPs can greatly reduce the quantity and frequency of CSOs, they do not eliminate them. Both the state and federal strategies require additional measures to meet CWA requirements. Onondaga Lake and its appropriate tributaries are listed as priority water problems; therefore, the BMP measures alone endorsed by the federal and state policies will not provide the necessary improvements to meet requirements of the CWA.

3. **SPDES/TMDL Approach.** The state strategy incorporates requirements for CSO abatement into the SPDES program. A watershed approach will serve as the basis to establish TMDLs and their relative impacts on water quality.

The TMDL process complements the federal and state strategies and allows for phasing projects over a negotiated time schedule. Phases are meant to accommodate economic as well as water quality concerns. Water quality concerns will be addressed through a build-and-measure approach that will provide data on actual water quality impacts as facilities are placed in operation.

4. **Onondaga County MCP.** Onondaga County has a long history of CSO abatement work starting with a USEPA-sponsored research and development program in the 1970s, a Facilities Plan in 1979, a BMP program in the 1980s, and an update of the Facilities Plan in 1991. The BMP program has been the most cost-effective step taken to date, resulting in a reduction of over 85 percent of the annual CSO volume to the receiving creeks. Table 4-1 lists the steps Onondaga County has taken and will take and their relationship to federal (NMC) and state (BMP) requirements. The 1991 Facilities Plan evaluated a number of alternatives that served as the basis of the facilities described herein.

Facilities proposed in this MCP are phased as interim and intermediate projects. Together, the two phases comply with the Federal Policy Presumption Approach, and to a limited extent, the Demonstration Approach. Results of hydrologic and water quality modeling, based on 1991 rainfall conditions, are included to demonstrate projected improvements and substantial compliance with ambient water quality standards upon completion of the intermediate phase. The MCP includes collection of water quality data through the intermediate phase to measure compliance. The proposed County program is consistent with the Federal Policy Presumption Approach, the state's CSO Strategy, and the TMDL process. Long-term considerations outlined herein represent facilities that would be needed in addition to the intermediate actions only if actual water quality data justify the need. Table 4-2 lists the application of federal and New York State CSO policies to Onondaga County.

4.1 INTERCEPTOR SYSTEM AND CSO TREATMENT CAPACITY NEEDS

A. **Existing Transportation Facilities.** The combined sewer system tributary to the METRO plant encompasses an area of approximately 10 square miles. All major Onondaga County trunk sewers and CSO discharge locations within the combined sewer area are shown in Figure 4-1. It is evident by these figures that the majority of CSO discharge points lie along Onondaga Creek and Harbor Brook. As shown in Figure 4-2, the combined sewer area is located totally within the corporate limits of the City of Syracuse. There are two major combined sewer drainage basins tributary to METRO: the Harbor Brook Service Area (via the HBIS) and the Main Interceptor Service Area (via the MIS). The MIS service area contains a portion of the Ley Creek natural drainage basin. Two different CSO areas [the upper Butternut trunk sewer service area (CSO 073) and the upper Hiawatha Trunk Sewer service area (CSO 074)] discharge their combined sewage into Ley Creek, while the regulated component of combined sewage ends up in the MIS via the Kirkpatrick Street pumping station and is treated at METRO.

The interceptor sewers currently receive the regulated component of combined sewage. As shown in Figures 1-7 and 1-8, the regulated flow exceeds the maximum design flow of the interceptors. The figures demonstrate that the collection system is designed to maximize flow conveyed to METRO.

B. **Simulation of Combined Sewer System with Stormwater Management Model.** The USEPA's Storm Water Management Model (SWMM) was used to model the combined sewer collection system tributary to METRO. The Facility Plan provides documentation of the development of the SWMM model and its resulting projections for both design storms and long-term simulation. Projections are shown for the CSO system for the existing conditions (no action), as well as each of the proposed abatement alternatives. The interception schemes for each RTF are included, as well as the resulting design hydrograph for the two principal design storms; namely, the 90-percentile and 1-year storms. The 90-percentile is defined as a storm that is exceeded, based on volume, by 10 percent of the storms during a typical year.

The Facility Plan also documents the long-term simulation of CSO discharges using 30 years of rainfall data. These data were used in conjunction with concentration data to project loadings for a number of parameters for the combined sewer system.

C. **Capacity for Future Growth.** The two principal interceptors (MIS and HBIS) that transport dry weather and combined sewage to METRO currently have adequate capacity to convey dry weather flow and a portion of wet weather flow to the plant. The average dry weather component represents approximately one-third of the interceptors' capacity. Capacity does exist for future growth but any increase in flow would take away from capacity currently used during wet-weather events.

Future development within Syracuse that would increase dry weather flow is limited by available land for this purpose. The City is largely developed and very little space is available for future development; however, redevelopment can occur at different locations within the City. It is unlikely that any significant growth will occur within the combined sewer system since population trends show a decreasing population projected for its service area.

4.2 "NO ACTION" ALTERNATIVE

Under the "no action" alternative, no improvements would be constructed, resulting in a continuation of CSO into the tributaries and Onondaga Lake. Neither Onondaga County nor the NYSDEC considers this to be a reasonable alternative or an acceptable course of action. Therefore, the "no action" alternative is inappropriate for further consideration.

4.3 INTERIM AND INTERMEDIATE CSO PROJECTS

The schedule of projects outlined below and their relationship to achieving compliance with CSO-related water quality objectives is described in Chapter 5. The projects included in the interim and intermediate phases are listed in Table 4-3.

A. **Interim Projects**. Onondaga County's proposed interim phase CSO improvements will be conducted between 1996 and 2000. This phase consists of a series of projects, including three demonstration facilities that will ultimately provide the basis for design/implementation of the next phases of CSO abatement facilities.

1. **Hiawatha Boulevard RTF (Vortex and Storage Demonstration).** The Hiawatha CSO Regional Treatment Facility is designed to demonstrate and test vortex/storage abatement

strategies. Design and construction of this facility will be partially funded by the U.S. Army Corps of Engineers (ACOE). Early construction of a facility at this location was prompted by the other public works projects that are planned in this area, including the Regional Market Expansion, Intermodal Transportation Center, and multi-purpose stadium projects. Preliminary design of this facility was completed in January 1995.

This project includes three primary elements:

a. **Combined Sewer Overflow Interceptor Sewer along Hiawatha Boulevard.** Construction of a 30-inch diameter sewer to relieve surcharging of the existing Hiawatha trunk sewer. This sewer will relieve three lateral sewers and will also intercept the existing CSO at Spring Street. Final design is complete on this work.

b. **Regional Treatment and Storage Facilities.** Wet weather CSOs from the new interceptor sewer will be directed into a swirl concentrator, where heavier solids and floatables will be removed. The overflow from this facility will then either be directed into a storage basin or be disinfected with sodium hypochlorite and discharged to Ley Creek. Preliminary design is complete. Final design will be completed by the ACOE.

c. **Underflow Force Main and Outfall Extension Pipeline.** An underflow force main will be constructed from the facility to the Ley Creek force main. This force main will be used during wet weather periods to discharge underflow from the vortex facility. After the storm subsides, the force main will serve to drain the storage and disinfection facilities as well. An outfall extension pipeline is necessary at this location due to planned improvements at the Regional Market and the proposed Intermodal Transportation Center. Final design is complete and construction is underway under the auspices of NYSDOT.

The facilities are designed to allow testing of the following scenarios:

a. Vortex followed by storage and then pumping to METRO or disinfection prior to discharge.

b. Vortex followed by disinfection.

c. Storage without preliminary treatment by vortex and then pumping to METRO or disinfection prior to discharge.

A parallel storm sewer is available at the treatment site and will be utilized to test the facilities at higher peak flow rates.

The effectiveness of the vortex facility in removing a number of types of pollutants will be evaluated on a storm-by-storm basis. Additionally, the effectiveness of high-rate sodium hypochlorite disinfection will be evaluated as part of this effort. The results of the disinfection testing will complement the efforts proposed at the Newell Street RTF.

2. **Newell RTF.** During the early 1970s, USEPA funded several research projects to evaluate the effectiveness of various CSO treatment technologies. A 12-foot diameter swirl concentrator was constructed at Newell Street under this program and was tested during a two-year period. This demonstration program showed swirl concentrator devices to be an effective method to remove settleable solids and floatables from CSO discharges. The current swirl unit is sized for approximately the 90-percentile storm. The 90-percentile storm is a storm which is derived from local rainfall data, whose total rainfall will not be exceeded on the average in any one year 10 percent of the time. It is approximately one half of the one-year storm, which occurs on average once per year.

It should be noted that chlorination/dechlorination serves as the basis for siting requirements and cost estimating at all RTFs. However, the Newell Street project will involve the testing of alternative disinfection technologies, and thereby sets the basis for the disinfection technology to be used at subsequent RTF facilities.

3. **Harbor Brook In-Water System.** A memorandum entitled "Harbor Brook FBM Long-Term CSO Analysis" (Moffa & Associates, December 4, 1995) (Appendix C-3) describes the hydrologic effects of the combined sewer and urban stormwater discharges within the lower Harbor Brook Basin. The CSO abatement proposed on Harbor Brook will use an in-lake technology called the EquiFlow™ system.

The Harbor Brook EquiFlow™ system will provide an opportunity to demonstrate abatement of CSO, urban stormwater, and non-point pollution through a combination of floatable solids entrapment, in-water storage, pumpback, and treatment at METRO. The in-water system will also include the construction of a floatable solids netting device to remove CSO and stormwater floatables from Harbor Brook before they reach the EquiFlow™ system. The EquiFlow™ system, to be located within Onondaga Lake at the mouth of Harbor Brook, will store the initial wet weather storm volume. This volume will be pumped to METRO for treatment when capacity is available.

The EquiFlow™ system is a series of compartments consisting of floating pontoons to which heavy gage polyvinyl chloride curtains, weighted at the bottom, are attached. Openings between cells allow the flow to pass from cell to cell in a serpentine, plugflow fashion. The system will contain a bypass for runoff in excess of the 13 million gallon system capacity. The proposed system is shown in Figure 4-3.

Combined sewer acreage within the Harbor Brook Basin constitutes approximately 20 percent of the total combined sewer area tributary to METRO. The proposed facilities are long-term, demonstration-type facilities that will undergo an effectiveness evaluation program. Evaluation during the demonstration period will determine whether the facilities should be expanded, modified or removed (i.e., whether they can serve a useful long-term role within an overall CSO abatement and METRO upgrade program).

The Harbor Brook basin is uniquely appropriate for the application of in-water-type treatment. The urbanized areas of the basin are located within the furthest downstream reaches and are closest to Onondaga Lake (Figure 4-4). The theoretical response of the Harbor Brook basin to a general basin-wide wet-weather event is illustrated on Figure 4-5. The combined and separate storm sewer systems quickly generate runoff that becomes the first wet-weather response of the entire basin.

The urban portion of the wet weather response of the brook will be captured within the in-water facilities for subsequent treatment at METRO and at a constructed wetland. The basis of design for the EquiFlow™ demonstration facility was one-half of the one-year design storm based on long-term simulation. Long-term simulation of the Harbor Brook basin requires a storage volume of 13 million gallons to contain one-half of the one-year CSO and urban stormwater flows.

NYSDEC has acknowledged that the proposed EquiFlow™ system may be considered a *long-term* demonstration project for the abatement of CSOs within the Harbor Brook basin. A 15-year period is the anticipated time frame for demonstration of these facilities. Significant water quality benefits and cost savings realized over the 15-year period with construction of the EquiFlow™ system justify project implementation. It is recognized that after the 15-year period, additional CSO facility planning and abatement measurements in the Harbor Brook basin may be necessary.

A pending grant through USEPA's Environmental Technology Initiative (ETI) will fund demonstration and evaluation of constructed wetlands treatment in conjunction with the EquiFlow™ system. Flows captured by the in-water system will be treated in a constructed wetland. Pollutant removals will be compared to METRO performance.

Results of the in-water treatment and wetlands treatment demonstration facilities may constitute an advancement in state-of-the-art pollution abatement and may be used to establish the full-scale design criteria for these facilities.

4. **EBSS Storage Upgrade.** The Erie Boulevard Storage System (EBSS) was constructed as part of BMP improvements in the early 1980s. The existing large diameter storm sewer running underneath Erie Boulevard (7.5 feet by 10.5 feet) was retrofitted with automated sluice gates and level sensors to entrap CSOs that discharge to this structure. These discharges were to be temporarily stored in the EBSS until METRO had capacity to accept the flow. Operational problems with control equipment prevented the system from functioning as intended. The EBSS is adequate to totally contain the discharge from a 90-percentile storm from its tributary area.

Certain improvements will be necessary for this system to function reliably. A vital component of the upgrade will be the installation of above-ground sluice gate control structures. In addition, all level sensors will require replacement and will be integrated with a state-of-the-art Supervisory Control and Data Acquisition (SCADA) control system.

As shown in Figure 4-6, the EBSS receives flow from three major sources:

a. Overflows from the Burnet Avenue trunk sewer, including the James Street relief sewer. (The Burnet Avenue trunk sewer is one of the major tributaries to the planned Franklin Street CSO Regional Treatment Facility.)

b. Overflows from the Fayette trunk sewer. (The Fayette trunk sewer is one of the major tributaries to the planned Clinton Station CSO Regional Treatment Facility).

c. Storm sewers at the upstream end of the system as part of the natural drainage basin.

As this system affects the potential design and operation of two other CSO abatement facilities (Clinton and Franklin), flows will be continually monitored to enable refinements and additional calibrations of the SWMM projections. Different control strategies may be developed subsequent to the construction of the Clinton or Franklin CSO abatement facilities that could maximize capture of CSO discharges and associated pollutants. An inflatable dam will be installed on the Burnet Avenue trunk sewer where the James Street relief sewer discharges to the EBSS. This will allow greater capture of combined flow during low intensity storms, thereby maximizing flow to METRO. The EBSS SCADA system will be used to regulate discharges by controlling the elevation of the inflatable dam and all gate structures.

5. **Kirkpatrick Street Pumping Station Upgrade.** The Kirkpatrick Street Pumping Station is the only large pump station in the combined sewer system. This facility was constructed in 1973 to pump flow from the Hiawatha trunk sewer into the MIS.

Recent monitoring and field investigations of the combined sewer system conducted for the preliminary design of the Hiawatha CSO regional treatment facility have shown that the Kirkpatrick Street Pump Station and discharge force main constitute a significant limitation to the capture and conveyance of wet weather flows in this basin. A comprehensive wastewater facilities plan and sewer system evaluation survey will be developed for the proposed upgrade of this facility to address the wastewater transportation needs of the Hiawatha trunk sewer and Oil City redevelopment areas. The pump station discharge will be removed from the main interceptor sewer and redirected to the headworks at METRO. Additional measures will include refitting the pump station with new pumps, drives, and controllers, as well as modifications at CSO 075 to eliminate discharges for storms up to the one-year storm.

6. **Evaluation of Siphon Crossings.** Approximately 20 siphons cross Onondaga Creek, conveying sewage from trunk sewers to the Main Interceptor Sewer. A smaller number also exist on the Harbor Brook interceptor. The dry weather bacterial concentrations and phosphorus loads observed in previous years in these streams may be an indication of problems with these siphons, many of which are 70 to 80 years old. These structures may be acting as sources of sewage discharge to these streams and Onondaga Lake during periods of low stream flow (exfiltration). It is proposed that these siphons be evaluated by the Department of Drainage and Sanitation and that any defects be repaired.

7. **Evaluation of CSO Toxicity.** In 1989, NYSDEC measured evidence of pollution-related stress on the macroinvertebrate populations of the principal tributaries of Onondaga Lake and concluded that the impacts appear to be a result of sewage discharges and toxic chemicals. In general, CSOs should not represent a significant source of potentially toxic material other than at certain locations where significant industries exist. The County proposes to monitor the collection system adjacent to industrial discharges and evaluate control methodologies to minimize or eliminate potential toxics from the streams.

8. **Floatables Control Strategy.**

a. **General.** A significant amount of floatable solids (floatables) are discharged to surface waters each year from CSOs. Floatable material represents an aesthetic degradation and a public health threat. The purpose of this section is to document interim and intermediate measures that OCDDS will take to reduce the volume of floatables discharged by CSO to its receiving waters. The State Strategy and National Policy have designated floatables control as an immediate priority.

b. **Floatables.** Floatables are waterborne waste materials and debris that are relatively buoyant and float at or below the water surface. The debris typically consist of man-made materials such as plastics, polystyrene, paper, and other constituents. These pollutants are not only aesthetically undesirable, but can be detrimental to both man and aquatic organisms. Floating debris can interfere with navigation by fouling propellers and water intake systems. Aquatic life can also be impacted by floating material through entanglement and ingestion.

The factors that affect the quantities of floatables removed at a location will depend on the configuration of the drainage system, the time of year, the interval between storms, as well as the floatables control technology(s) employed. The County proposes to construct floatables entrapment devices at the following locations:

1) **Harbor Brook Floatables Control Facility (FCF).** The Harbor Brook floatables netting device will be located in the downstream reach of the brook between Hiawatha Boulevard and the outlet to Onondaga Lake. By placing the facility as close to the lake as possible, floatables capture will be most effective for the entire brook. The purpose of this facility is to capture most floatable material that is discharged to the lake from Harbor Brook. A secondary purpose of this facility is to capture floatables in the brook before they enter the proposed EquiFlow™ facility.

2) **Teall Brook FCF.** The Teall Brook FCF will be located downstream of the CSOs that are discharged into the brook. The optimal accessible location appears to be the outlet of the storm sewer at the origin of the brook at Teall Avenue. The purpose of this facility would be to capture floatable material discharged from the CSO system in this northern section of the City.

3) **Hiawatha RTF.** The Hiawatha RTF is a Demonstration Project to evaluate vortex treatment, in-line and off-line storage, and disinfection of the CSO. Details of this project can be found in Chapter 5. Floatables capture and return to the wastewater treatment facility via a "foul sewer" or underflow is an integral part of vortex treatment devices.

4) **Onondaga Creek Floatables Control Facility (Boom with Collection Structure).** The Onondaga Creek facility will be located downstream of all CSOs which discharge into the creek and above the Inner Harbor area. The best location appears to be in Onondaga Creek just downstream of the Kirkpatrick Street bridge and just upstream of the Inner Harbor. A facility has been conceptually designed consisting of a floatables boom with a collection structure (Calocerinos and Spina, 1994) for the City of Syracuse. The proposed facility is shown in Figure 4-7.

This approach provides for a method of removing floatables that has high interoperability and reliability while providing relatively low maintenance. This solution will control floatables discharged into the Inner Harbor, and thus Onondaga Lake, for most flow conditions.

A project management plan, scope of work, and preliminary design effort are currently underway through a joint effort involving the City of Syracuse, Onondaga County Department of Drainage and Sanitation, and the ACOE.

9. **Non-Point Source Identification.** A non-point source study is consistent with the federal watershed approach and the TMDL process, but not a requirement of the federal or state CSO policies. The identification of non-point source loadings can be accomplished through a watershed approach consisting of three components:

a. The development of a geospatial database.

b. The construction of a mathematical model capable of predicting pollution loads from all areas of the watershed.

c. The implementation of a comprehensive, long-term monitoring program to validate the watershed model and to measure the effectiveness of any abatement schemes.

These components form the objective, which is to use the information from all three to generate reliable pollutant estimates from the entire watershed.

The estimation of pollution loads from throughout the watershed would make use of all three sources of information, principally through a validated watershed model. The calculation of long-term statistics and event-specific pollutographs will be possible for a variety of important pollutants (e.g., suspended solids, total phosphorus, and total nitrogen). A variety of future land use scenarios and population growth trends can then be considered.

It is important to note that the County will require funding for this study from an outside source. A project of this magnitude and scope must be conducted over at least two years. A preliminary estimate of the costs are $280,000 for a full two-year period.

B. **Intermediate Projects.** The intermediate CSO abatement measures are structured to further reduce CSO impacts and to achieve water quality standards in Onondaga Lake and Onondaga and Ley Creeks. The principal focus of the intermediate projects is the abatement of CSO discharges within the Onondaga Creek basin. This effort will require the construction of RTFs at Midland Avenue, Clinton Station, Franklin Street, and Maltbie Street. Sewer separation is an integral part of the overall approach for controlling CSO discharges within the Onondaga Creek basin. Sixteen small CSO drainage basins will be separated rather than incorporating them into the regional treatment facilities. These basins are shown in Figure 4-8.

1. **Midland RTF.** The Midland RTF will be located near Oxford Street and Onondaga Creek. The service area for this facility encompasses the majority of the combined sewer area on the southern end of the City of Syracuse. The pipelines would be sized on the basis of a one-year storm which would, in a normal year, intercept all CSO discharges up to one or two events per year. Even above the one-year event, the collection system would intercept a high percentage of the volume associated with these CSO events. The general layout of the facility is shown in Figure 4-9.

The proposed treatment facility would include coarse screening in front of the facilities pump station wet well. Pumps would be used to lift the flow from the CSO transmission pipelines up to the vortex device where floatables and gross solids would be removed. The flow would then proceed to the disinfection tank, where it will be disinfected with either sodium hypochlorite or another disinfectant recommended after completion of the Newell Street CSO disinfection demonstration project. All treatment and transmission processes would be sized to accommodate the one-year storm at this facility. Concentrated solids from the RTF would be discharged back into the MIS for treatment at METRO. This facility, like that of Clinton Station, incorporates an interconnection to the MIS that will allow relief of surcharging conditions on the MIS during intense rainfall events. The only time that the interconnection would be active is during MIS surcharging conditions, thereby ensuring that the more concentrated "first flush" of pollutants is retained within the MIS.

The substantial volume of in-line storage of the CSO interceptor pipeline allows the shaving of hydrograph peaks for smaller overflow events. This will allow for increased treatment efficiency.

2. **Clinton RTF.** The proposed Clinton RTF will abate those CSO discharges located within the downtown portion of the Onondaga Creek basin. As in the case of the Midland RTF, the interceptor pipelines will be designed to transmit the discharges associated with all CSO events equal to or less than the one-year storm. The length and diameter of the associated pipelines also allows the capture and storage of an appreciable percentage of all annual wet weather discharges. This RTF, like the previously discussed Midland RTF, will have a connection to the MIS to relieve excessive surcharging. Pipelines necessary to intercept the discharge from the above-noted overflows will be constructed first and will terminate at the wet well for the RTF. The general layout of this facility is shown in Figure 4-10. A floatables entrapment device will be installed within the wet well area until such time when the remainder of the RTF is constructed. Many of the floatable solids will be removed at the point of discharge rather than being captured by the Onondaga Creek boom located at the head of the Inner Harbor. This phased construction concept is illustrated in Figure 4-11.

The basis of design of the RTF will be the 90-percentile storm for the vortex device and one-year for the disinfection facilities. The wet well and pumping capacity for the Clinton RTF, however, will be sized to accommodate the peak discharge of a one-year storm. This is necessary to provide for disinfection of all flows up to the magnitude of a one-year storm rate. The 90-percentile storm will generate a peak discharge of 230 cfs, whereas the one-year storm generates 450 cfs. It is important to note that the time associated in a typical year with flow rates above the 90-percentile design flow rate is only a few hours at most. It is expected that the efficiency of disinfection will decrease by some percentage for the time during which the design rate is exceeded; however, is not expected to have an impact on achievement of annual water quality objectives for Onondaga Lake. The disinfection testing at the Newell Street and Hiawatha RTF demonstration facilities will evaluate the effectiveness of high-rate disinfection of CSO discharges at flows above the design rate of the facility.

The design of the Clinton RTF will allow for the expansion of the facility up to the one-year storm basis of design. For example, the 90-percentile storm design would require the construction of one 48-foot diameter swirl concentrator. Expansion of the facility for flows up to the one-year storm would require a second 48-foot diameter unit along with the associated disinfection tankage.

3. **Franklin FCF.** The Franklin FCF will be located near the intersection of Routes 690 and 81. At this location, the two tributary trunk sewers associated with this facility (Burnet Avenue and Butternut Street) are only 400 feet apart. These trunks serve the northeast portion of the City. The short footage of CSO interceptor sewer required (sized for the one-year storm) allows construction of these pipelines and a floatables containment structure much earlier in the overall abatement program. Many of the floatable solids would be removed at the point of discharge rather than being captured by the Onondaga Creek floatables trap located at the head of the Inner Harbor. As in the case with the Clinton RTF, the pipelines would be constructed in conjunction with what may be a wet well in the future for a RTF at this site. This concept is demonstrated on Figure 4-11.

4. **Maltbie FCF.** Maltbie Street was the scene of a USEPA CSO Demonstration Facility in the mid-1970s. The facility has been completely abandoned and little of the remaining infrastructure can be incorporated into the abatement facilities recommended as part of this effort. The proposed facility will receive runoff from an area that is primarily light industrial and commercial in nature. As such, the bacterial concentrations and loadings to Onondaga Creek and Onondaga Lake are lower than those compared to residential areas. The point of discharge, however, is across from the Onondaga Creekwalk and is highly visible to individuals on that pathway. As such, floatables containment is a short-term objective at this site. A floatables netting device will be incorporated into the remnant of the pumping station superstructure for the demonstration facility to accomplish this objective.

CSOs 065 and 066 are tributary to this facility. The interceptor pipeline for this facility has already been constructed due to a failed regulator sewer for CSO 065 in 1995.

5. **Sewer Separation.** As previously noted, sewer separation is a cost-effective approach of abating CSO discharges for a selected portion of the Onondaga Creek basin. It will be less expensive to separate a number of small and remote CSO basins than to incorporate them into other RTFs or FCFs. Table 4-4 lists those sewers selected for separation. These basins are shown in Figure 4-8.

The total acreage for separation represents 3.1 percent of the total combined area in the collection system. Separation of the overall combined sewer area was evaluated as part of the CSO facility plan and found not to be a cost-effective approach to CSO abatement. Costs for the overall separation alternative were higher than the program recommended herein, and the annual pollutant capture was smaller than that associated with the program recommended in this MCP.

The above-noted combined basins would be separated through the construction of a new sanitary sewer system within these areas and through the conversion of the existing combined sewer into a storm sewer.

4.4 CONCEPTUAL LONG-TERM PROCESS

The programs recommended within the interim and intermediate phases are designed to achieve compliance with existing water quality objectives and meet the requirements of the consent order. Onondaga County is committed to evaluating the effectiveness of the elements of this MCP in bringing the CSOs into compliance with the goals of the CWA, the state and federal CSO policies, and New York State ambient water quality standards. Following completion of the intermediate phase, the County will continue on a conceptual long-term process to evaluate whether additional measures are required. Ambient water quality, progress towards attainment of designated uses, and changes in regulations and policies will be evaluated in a context that is consistent with the TMDL process. Potential long-term alternative projects have been described in Chapter 3 of the DEIS.

TABLE 4-1

ONONDAGA COUNTY COMPLIANCE WITH
STATE AND FEDERAL CSO BMP REQUIREMENTS
Municipal Compliance Plan
Onondaga County, New York

STATE BMP NO. AND DESCRIPTION	FEDERAL NO.	ONONDAGA COUNTY COMPLIANCE STATUS
1. CSO maintenance/ inspection	1	In compliance
2. Maximize use of collection for storage	2	Will essentially be achieved with reactivation of EBSS.
3. Industrial pretreatment	3	Pretreatment program in place; additional evaluation of CSO toxics will be done as interim measure.
4. Maximize flow to the POTW	4	The collection system currently has the capacity to deliver the required flows for primary and secondary treatment. Three of the interim CSO projects will increase the total theoretical collection system capacity.
5. Wet weather operating plan	N/A	Onondaga County will submit a wet weather operating plan within the required time frame of the permit.
6. Prohibition of dry weather flows	5	In compliance.
7. Control of floatables and settleable solids	6	Interim CSO measures will bring the County into compliance to protect the lake; intermediate projects will provide protection for Onondaga Creek. All floatables will be controlled in Ley Creek via interim projects.
8. Combined sewer replacement	N/A	OCDDS will coordinate combined sewer replacement with NYSDEC as required.
9. Combined sewer extension	N/A	OCDDS will coordinate combined sewer extension projects with NYSDEC as required.
10. Connection prohibition	N/A	OCDDS will prohibit any further connections to sewers that are experiencing frequent surcharging that results in basement flooding.
11. Septage and hauled waste	N/A	OCDDS prohibits the discharge of septage and hauled waste upstream of any CSO. Such material can only be discharged at METRO.
12. New development impact reduction	N/A	OCDDS endorses the principals contained in the NYSDEC document entitled "Reducing the Impacts of Storm Water Runoff from New Development."
13. Public notification	8	OCDDS will post signs at all CSO discharges as required by its permit.
Pollution prevention programs	7	Part of the industrial pretreatment program.
CSO monitoring	9	OCDDS will incorporate monitoring provisions into all interim and intermediate projects.

TABLE 4-2

APPLICATION OF FEDERAL AND NEW YORK STATE CSO POLICIES
TO ONONDAGA COUNTY
Municipal Compliance Plan
Onondaga County, New York

EARLY ACTIONS	ADDITIONAL ACTIONS	IMPLEMENTATION
Federal CSO Control Policy Nine Minimum Controls (NMC) (reference Table 4-1)	Long-term control measures: • Presumption Approach • Demonstration Approach (all apply)	Implementation delegated to New York State through SPDES permit system
New York State CSO Control Strategy Best Management Practices (BMPs) (reference Table 4-1)	Additional Control Measures: Comprehensive Facility Planning Effort • Collection system analysis • Treatment plant analysis • Receiving water quality analysis	Implementation through SPDES permit and phased TMDL approach
Phased TMDL Approach Framework watershed modeling	Watershed Monitoring and Modeling • Solids and floatables fate/transport • Bacteria • Nutrients	Implementation through a "build and measure" approach
Onondaga County CSO Implementation Through MCP BMP improvements from 1979 facility planning effort Update Facility Plan (1991) Additional BMP improvements included as interim projects	Interim projects (1996-2000) Intermediate projects (2001-2020) Conceptual long-term actions	Facility construction in accordance with negotiated schedule and lake water quality assessment program

1/

TABLE 4-3

INTERIM AND INTERMEDIATE PHASE PROJECTS
Municipal Compliance Plan
Onondaga County, New York

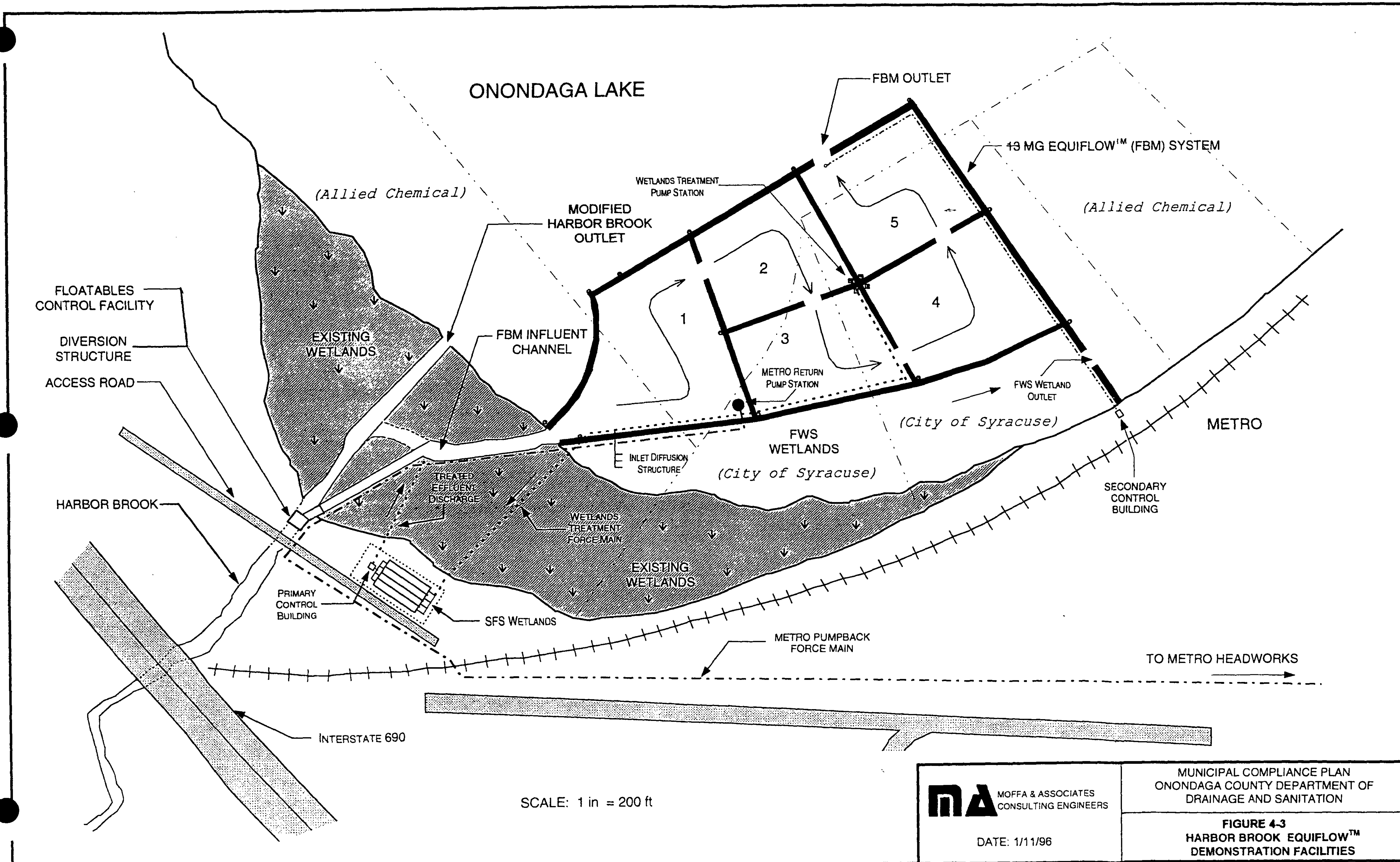
PHASE	PROJECTS
Interim	Hiawatha Blvd. Regional Treatment Facility (RTF)
	Newell Street RTF
	Harbor Brook Equiflow and Wetland Demonstration
	EBSS Storage Reactivation
	Upgrade of Kirkpatrick Street Pump Station
	Evaluation of Siphon Crossings
	Evaluation of CSO Toxicity
	Floatables Control Facilities (FCF)
	Non-Point Source Identification
Intermediate	Midland Avenue RTF
	Clinton Station RTF
	Franklin Street FCF
	Maltbie Street FCF
	Sewer Separation
Continual	Monitoring and Assessment of Improvements to Receiving Waters

Facilities beyond the intermediate (long-term) would be needed only if actual water quality data justify the need.

<u>TABLE 4-4</u>

SEWERS RECOMMENDED FOR SEPARATION
Municipal Compiaince Plan
Onondaga County, New York

CSO BASIN NO.	CSO BASIN ACREAGE
022	15.3
024	2.9
037	33.2
038	10.1
040	12.2
045	6.6
046A	14.9
046B	16.4
048	9.1
050	30.0
051	25.0
053	9.6
054	9.9
057	3.9
058	3.0
058	10.7
Total Acreage	212.8



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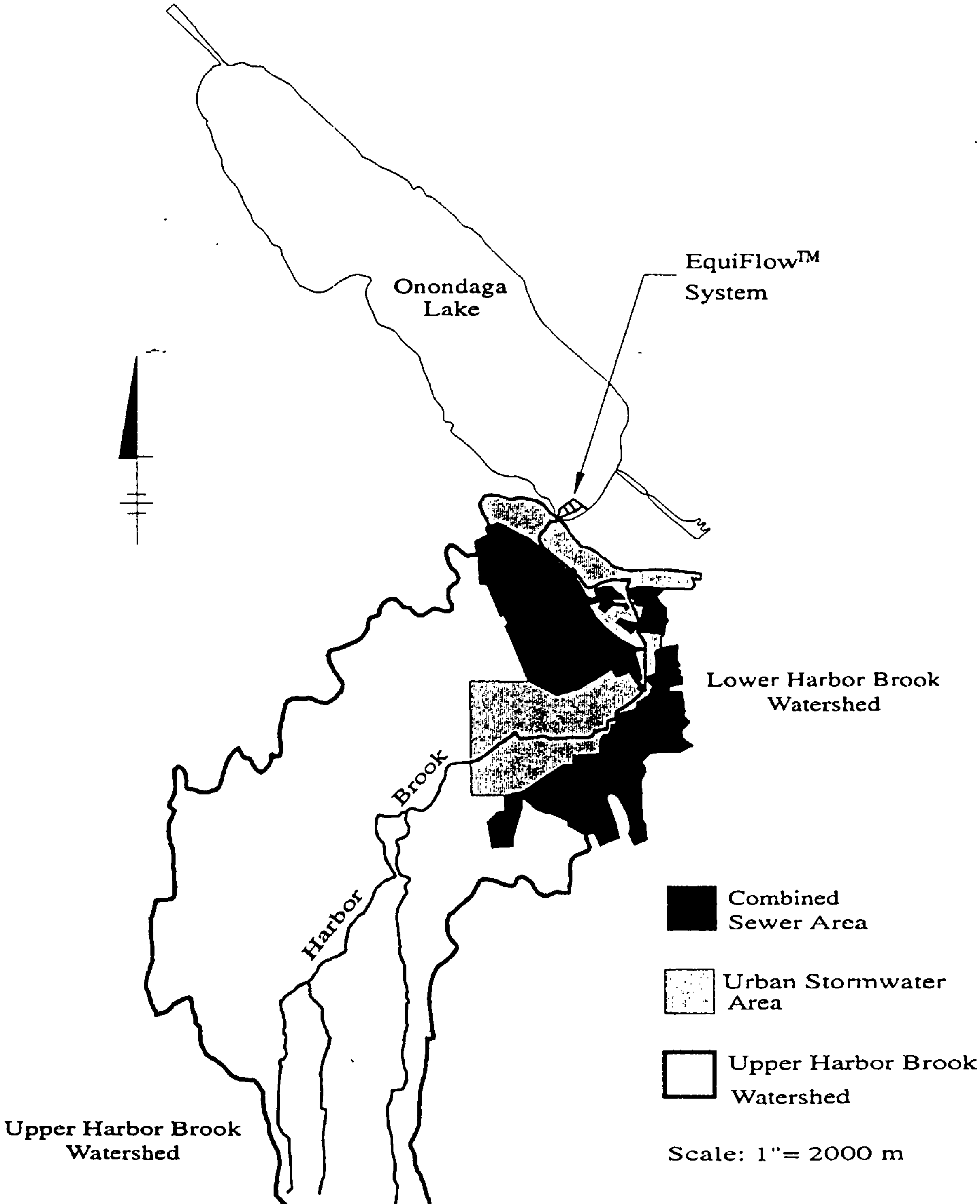
DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 4-3
HARBOR BROOK EQUIFLOW™ DEMONSTRATION FACILITIES



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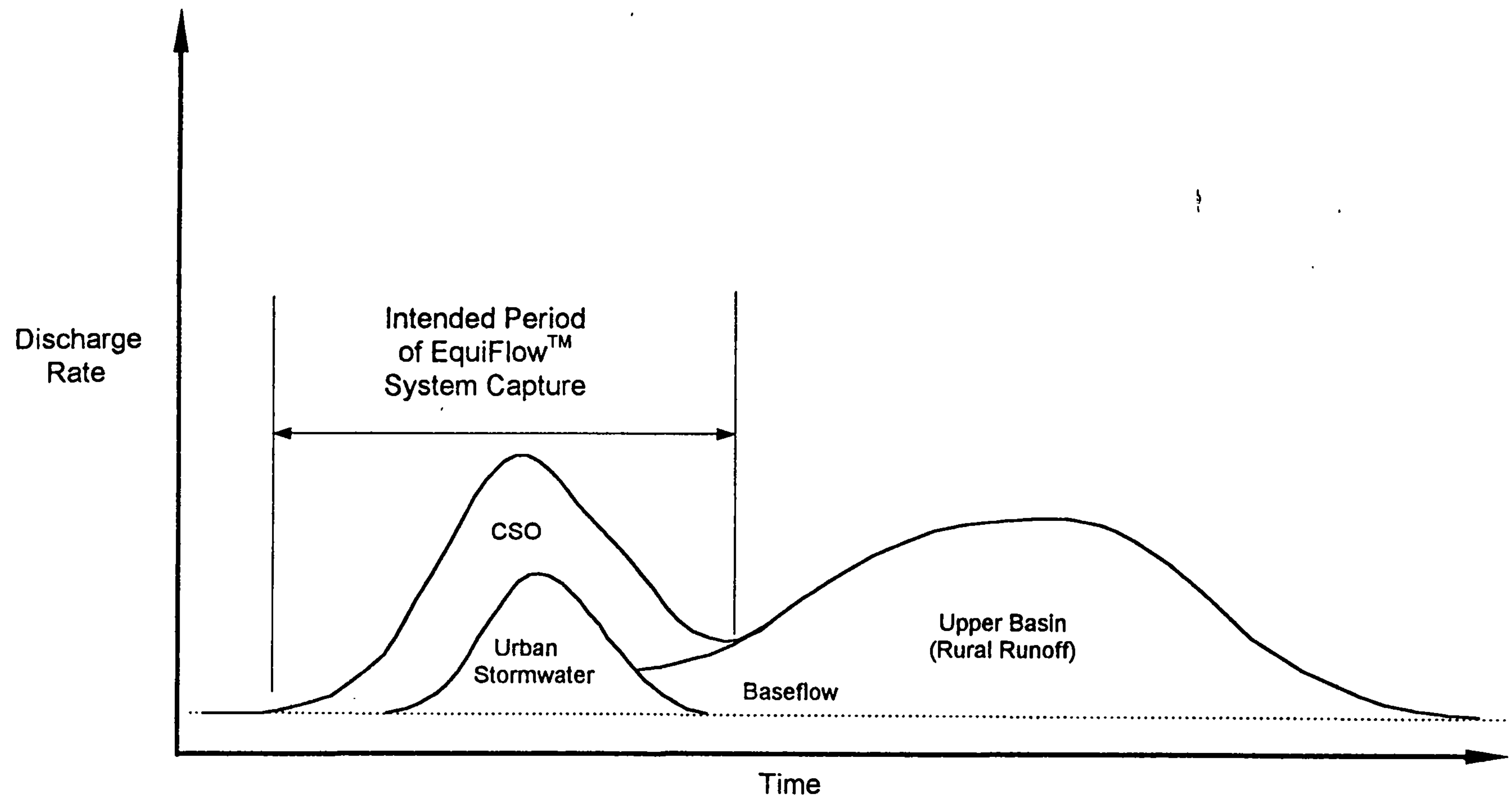
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 4-4
HARBOR BROOK WATERSHED



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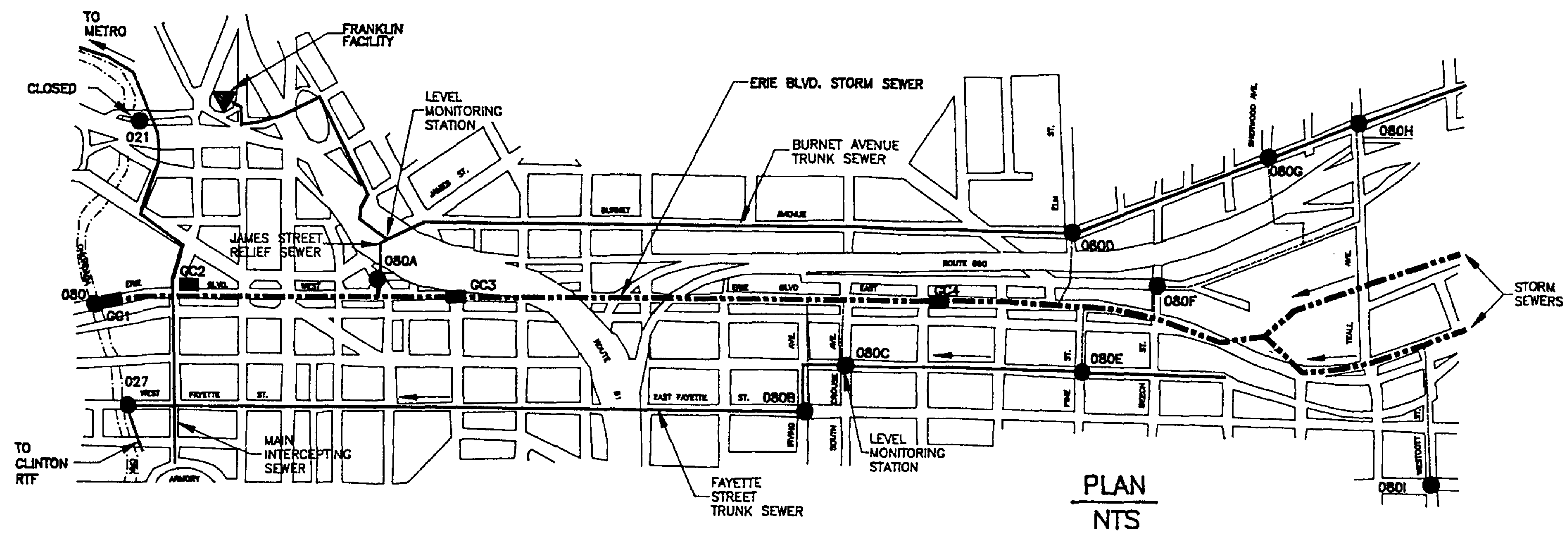
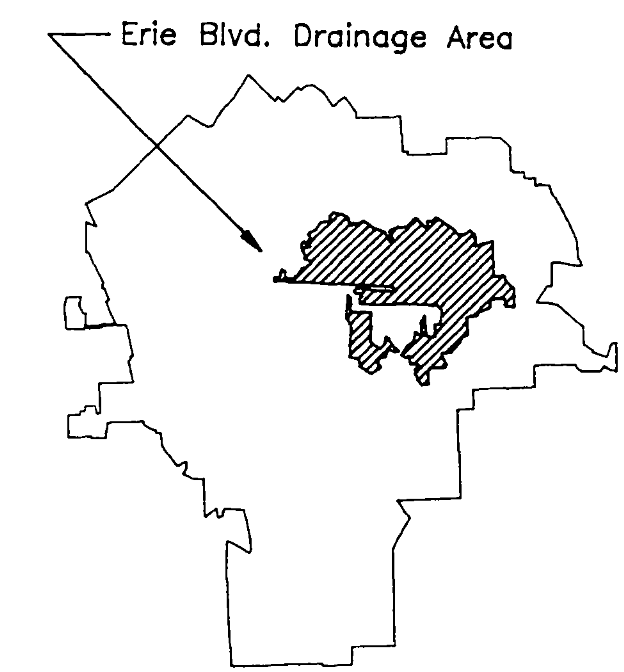
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

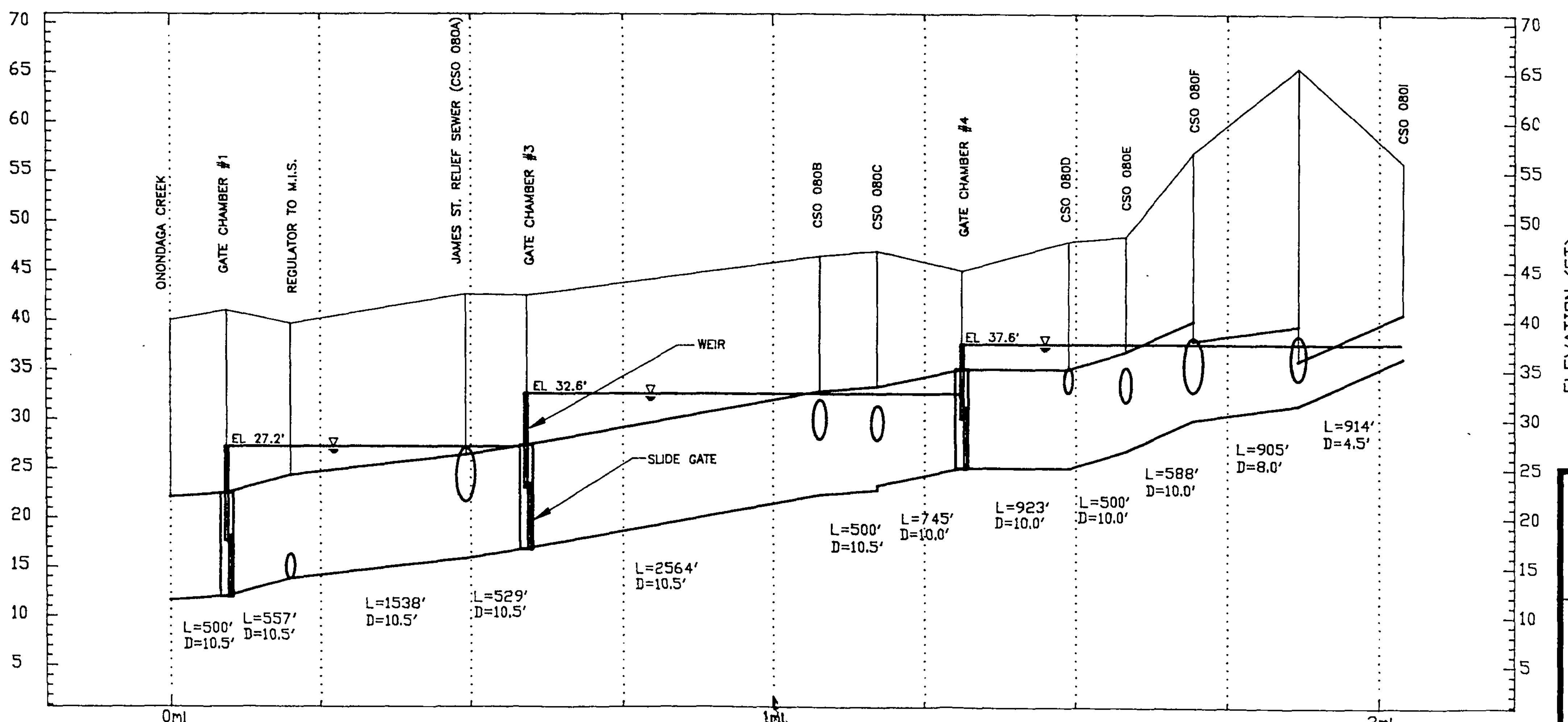
FIGURE 4-5
COMPONENTS OF A THEORETICAL DISCHARGE EVENT HYROGRAPH FROM THE HARBOR BROOK BASIN



PLAN
NTS



CITY OF SYRACUSE, NEW YORK



PROFILE
Scale Approx. As Shown

DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
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FIGURE 4–6
ERIE BLVD. STORM SEWER SYSTEM
OPERATION (SLUICE GATES CLOSED)

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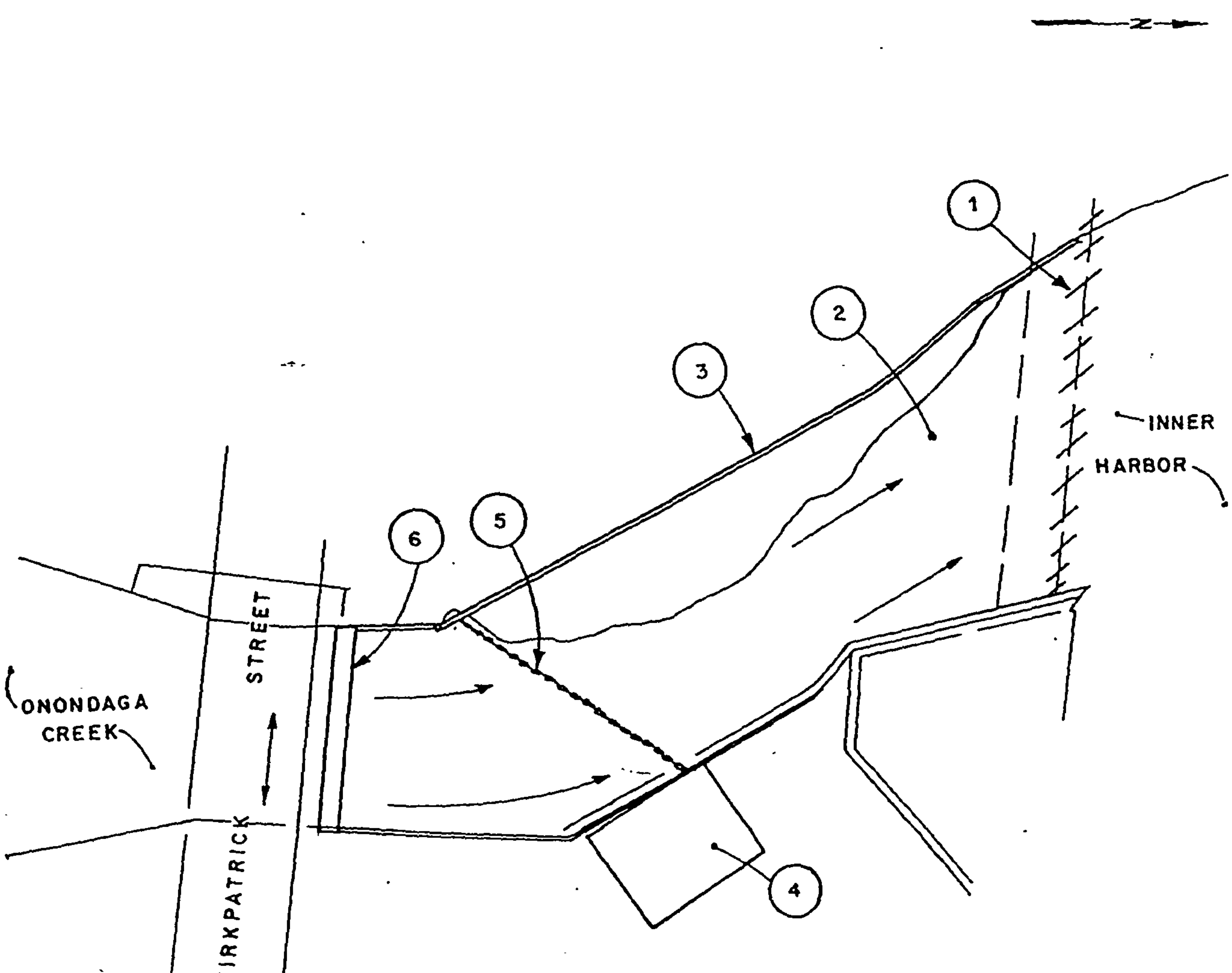
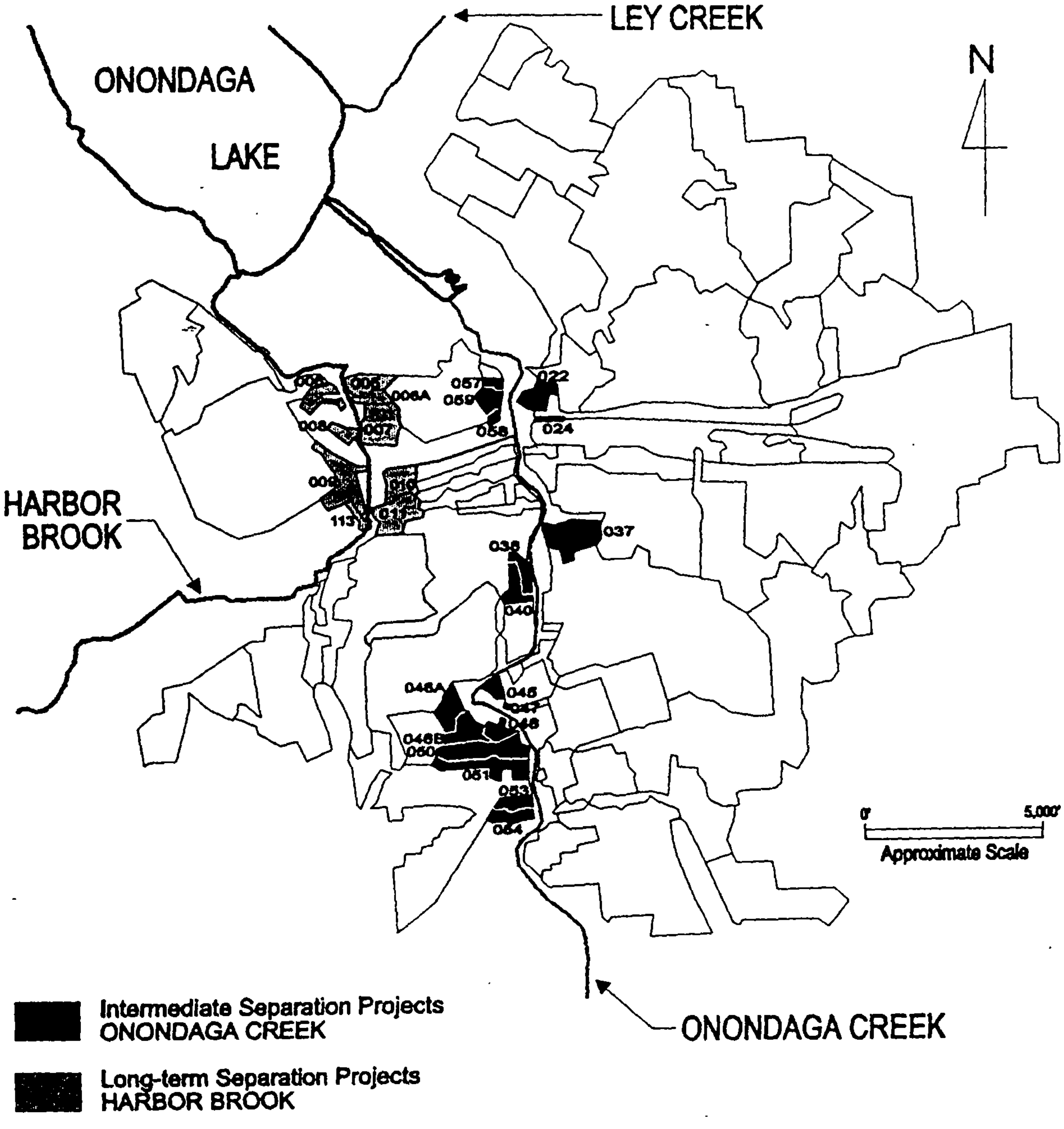


MAJOR WORK ITEMS:

1. Remove Existing Spillway
2. Dredge & Widen Channel
3. Sheet Both Sides Of Channel
4. Construct Floatables Collection Structure
5. Construct Boom System
6. Construct New Spillway

Source: C&S Engineers, Inc. (December, 1994)

MOFFA & ASSOCIATES CONSULTING ENGINEERS	MUNICIPAL COMPLIANCE PLAN ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION
DATE: 1/11/96	FIGURE 4-7 ONONDAGA CREEK FLOATABLES BOOM SYSTEM



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MUNICIPAL COMPLIANCE PLAN
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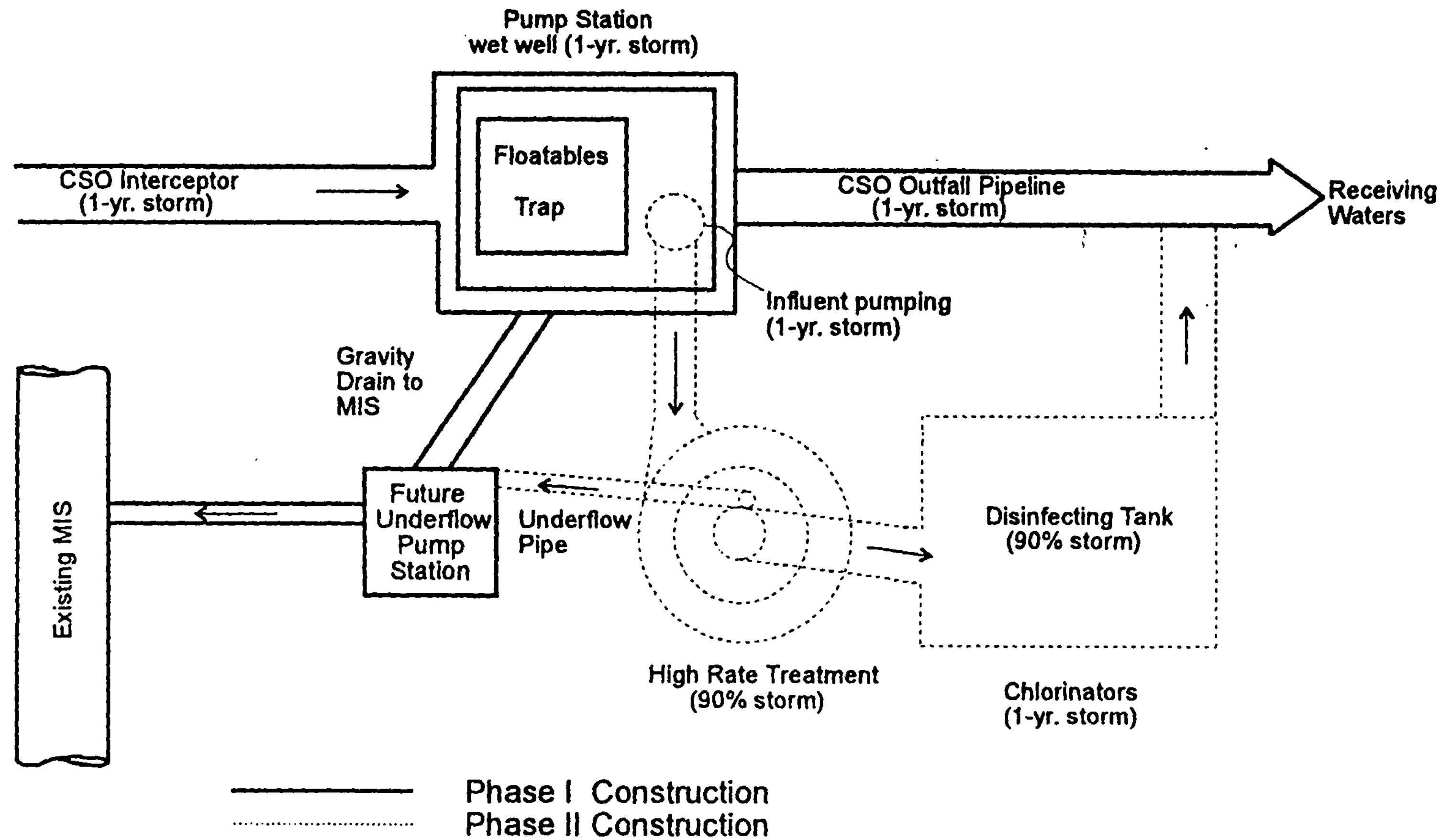
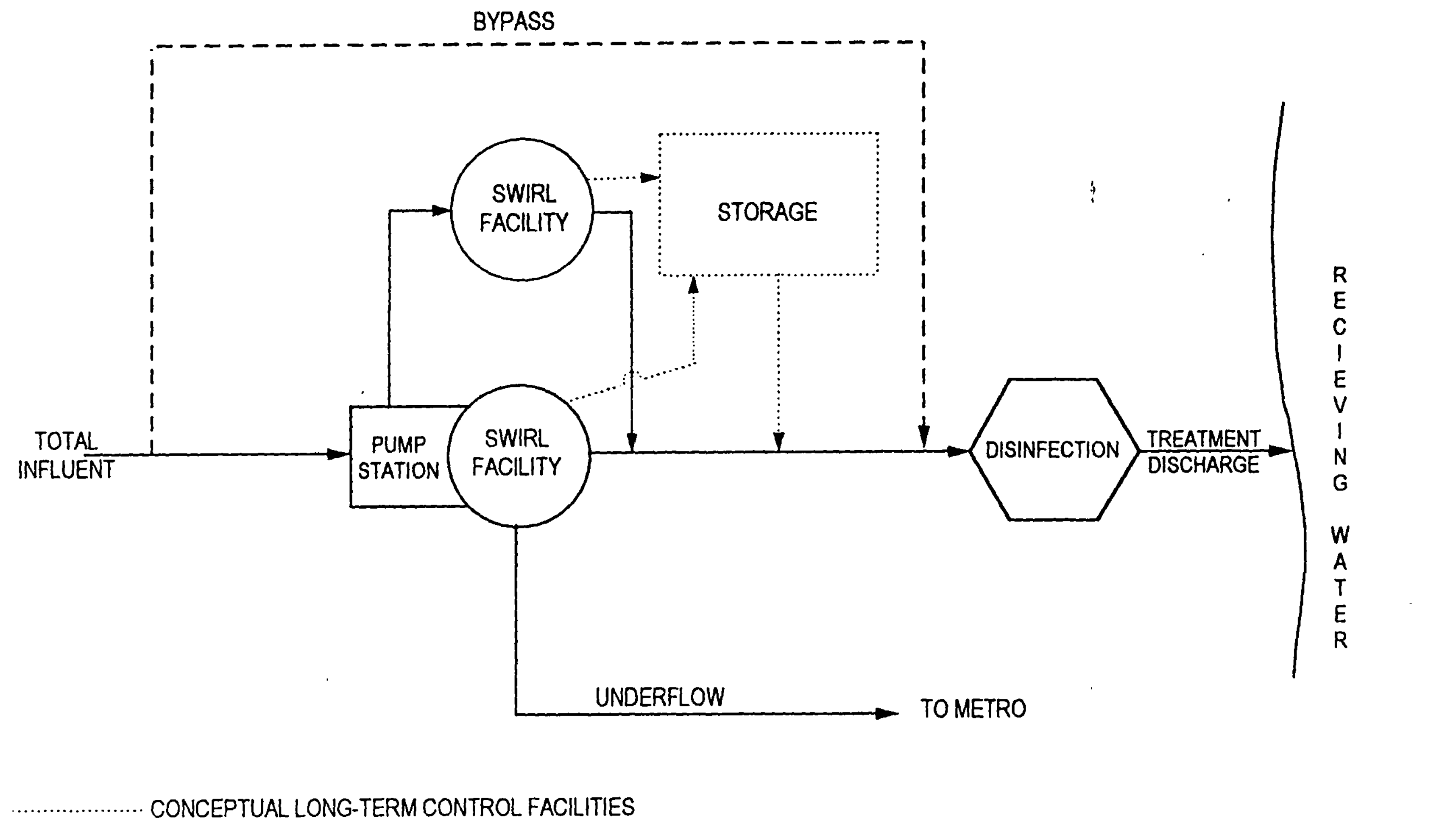
FIGURE 4-8
AREAS RECOMMENDED FOR
SEWER SEPARATION



NOTES: 1. Floatables trap will be removed during Phase II Construction
2. Underflow pumps and sluce gates will be added to underflow pump station in Phase II

MOFFA & ASSOCIATES CONSULTING ENGINEERS	MUNICIPAL COMPLIANCE PLAN ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION
DATE: 1/11/96	**FIGURE 4-11 PHASED CONSTRUCTION OF REGIONAL TREATMENT FACILITIES**



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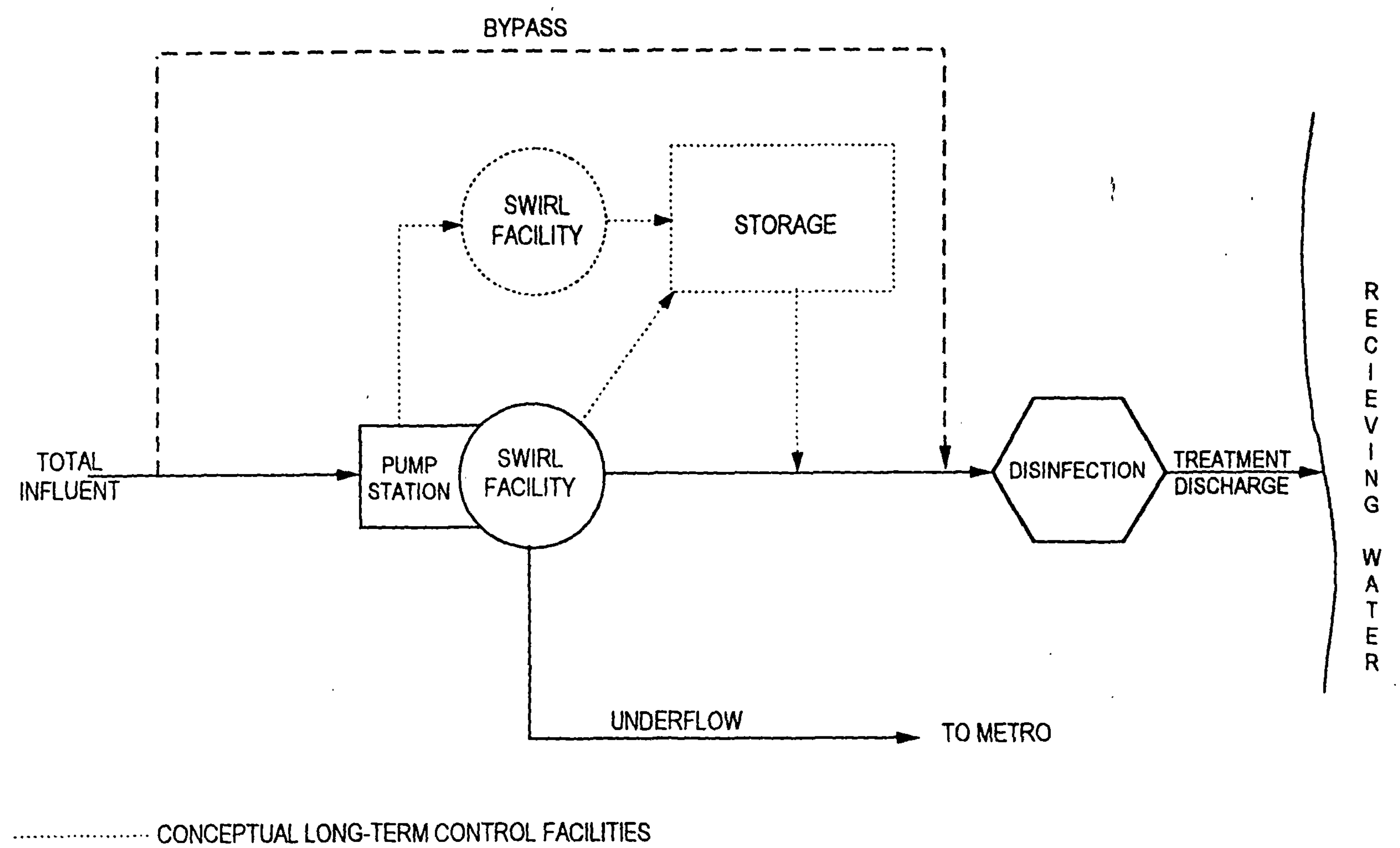
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 4-9
FLOW SCHEMATIC FOR MIDLAND REGIONAL TREATMENT FACILITY



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MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 4-10
FLOW SCHEMATIC FOR CLINTON REGIONAL TREATMENT FACILITY

Section Five

CHAPTER 5 - PROPOSED ACTIONS
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CHAPTER 5

PROPOSED ACTIONS

5.0 GENERAL

This chapter discusses the proposed actions to be undertaken by Onondaga County to address the impacts of the METRO and CSO discharges on water quality conditions in Onondaga Lake and its tributaries. As discussed in Chapter 2, the proposed actions include:

1. Establishment of an immediate "cap" on phosphorus and ammonia mass loadings discharged by METRO to Onondaga Lake by modification of SPDES permit effluent limitations.

2. Implementation of a series of interim and intermediate projects involving improvements to METRO which include expansion of flow capacity, upgrade for year-round ammonia removal, permanent chemical storage and feed facilities for phosphorus removal, and effluent dechlorination.

3. Implementation of a series of interim and intermediate projects to address the impacts of CSO discharges on compliance with water quality standards for bacteria and floatable solids in Onondaga Lake and the tributaries.

4. A long-term water quality monitoring program to assess the impacts of interim and intermediate METRO and CSO improvements on water quality conditions in Onondaga Lake and to determine the need for further improvements.

5. Implementation of a demonstration project to assess the technical feasibility and determine the costs and environmental impacts associated with hypolimnetic oxygenation suggested by USEPA as a means for improving dissolved oxygen conditions in the lake until such time as decisions on long-term alternatives can be made.

The phased implementation of METRO and CSO improvements will proceed in parallel with ongoing water quality remediation efforts involving the USEPA, NYSDEC, and AlliedSignal Corporation in connection with the NPL listing of Onondaga Lake as a federal Superfund site. The goals and objectives for these coordinated efforts involve elimination of water quality impairment and restoration of the designated best use of the lake and tributaries.

5.1 METRO IMPROVEMENTS

A. **Overview of METRO Improvements.** The interim and intermediate METRO improvements include capital projects, as well as changes in operating and maintenance strategies which, when completed, will result in upgrading of the level of wastewater treatment provided for year-round removal of ammonia, reduction of effluent chlorine residuals resulting from seasonal wastewater disinfection, and further reduction of phosphorus. In addition, the proposed improvements will increase the permitted flow capacity from 80 mgd to 84.2 mgd to allow for future growth within the METRO service area.

Interim METRO improvements to be implemented by the year 2000 include:

1. Operational changes to maximize the ammonia removal capabilities of existing facilities following the construction and startup of industrial wastewater pretreatment facilities by Bristol-Myers Squibb, Inc. in 1996.

2. Replacement of the METRO digital system to provide capacity for additional instrumentation and process monitoring necessary for operation and control of the plant for ammonia removal.

3. Design and construction of plant improvements to reduce odor emissions and improve handling of residuals from wastewater screening and grit removal facilities.

4. Evaluation of mechanical sludge thickening improvements and retrofit of the existing secondary anaerobic sludge digester for use as a primary digester to improve sludge thickening and increase sludge digestion capacity.

5. Design and construction of miscellaneous plant improvements to correct design deficiencies, improve worker safety, and replace or repair deteriorated equipment. This work will include modifications to provide capability for chlorination of return activated sludge in order to control sludge bulking, which may increase with operation for ammonia removal.

6. Design and construction of permanent chemical storage and feed facilities for phosphorus removal by chemical precipitation.

Intermediate METRO improvements will include an ammonia removal demonstration project involving upgrading of one quarter of the METRO plant to evaluate ammonia removal capabilities of conventional and advanced integrated fixed-film activated sludge (IFAS) technologies. The results of the demonstration project will be used for final process selection and determination of design criteria for full-scale upgrading of METRO for year-round ammonia removal. In conjunction with the one-quarter plant upgrade, the existing mechanical surface aerators which have reached the end of their useful life will be replaced with cost-efficient fine bubble diffused aeration equipment. This replacement will be performed in all of the aeration tanks at METRO.

The phased implementation of interim and intermediate improvements will allow for the optimization of METRO plant performance following the anticipated startup of industrial wastewater pretreatment facilities by Bristol-Myers Squibb, Inc. in 1996. Optimization of plant performance will accomplish maximum reuse of existing facilities, thereby minimizing capital expenditures for additional facilities. Phosphorus and ammonia loading reductions accomplished as a result of interim and intermediate improvements will be reflected in modification of SPDES permit effluent limits.

In addition to the interim and intermediate METRO improvements, Onondaga County will undertake a demonstration project during the interim phase involving oxygenation of the hypolimnion of Onondaga Lake. Hypolimnetic oxygenation has been proposed by USEPA as a means of attaining compliance with ambient water quality standards for dissolved oxygen. The demonstration project will evaluate the technical feasibility of this alternative, as well as its cost and environmental impacts.

B. Preliminary Basis of Design.

1. **Influent Wastewater Flows and Loadings.** The development of projected wastewater treatment capacity needs for the METRO service area is presented in Section 3.1 of Chapter 3. Projected wastewater treatment capacity needs reflect current operating conditions with adjustments for the projected impacts of industrial wastewater pretreatment by Bristol-Myers Squibb and combined sewer overflow abatement. In addition, an allowance for future growth capacity within the METRO service area has been included.

Table 5-1 summarizes average daily influent sewage flow and pollutant loadings representative of current and design operating conditions. As shown in Table 5-1, the proposed METRO upgrade will be designed for pollutant loading conditions that are less than current operating conditions.

2. **Effluent Limitations.**

a. **Phosphorus and Ammonia Cap.** The phased TMDL strategy includes an immediate modification of the METRO SPDES discharge permit to establish effluent limitations capping phosphorus and ammonia mass loadings discharged to Onondaga Lake based upon current plant performance capabilities. The phosphorus and ammonia mass loading caps will reflect phosphorus and ammonia loading reductions accomplished by METRO above and beyond the current SPDES permit requirements, and will prevent further deterioration of water quality in Onondaga Lake.

Based on an analysis of plant performance monitoring data collected since the completion of METRO improvements resulting from the Comprehensive Plant Evaluation conducted in 1989, the phosphorus and ammonia caps will be set at 400 lb per day and 15,200 lb per day, respectively. The phosphorus cap will be expressed as a maximum 12-month rolling average loading to reflect the long-term impacts of phosphorus on water quality; whereas, the ammonia cap will be expressed as a maximum monthly average loading to reflect the shorter-term impacts of ammonia toxicity.

b. **SPDES Modification - Interim Improvements.** During the interim phase, Onondaga County will continue to monitor the progress and performance of the industrial wastewater pretreatment system being constructed by Bristol-Myers Squibb, Inc., as well as the performance of the METRO plant. The monitoring at METRO will include all parameters and sampling locations necessary to develop a facility-wide mass balance for ammonia and phosphorus so as to document the combined impacts of Bristol-Myers Squibb pretreatment and METRO operating changes on plant performance.

By December 31, 1997, the County will prepare an interim report for submission to NYSDEC documenting the status of the Bristol-Myers Squibb pretreatment facility in achieving the performance goals previously prevented in Table 3-2. The interim report will also summarize the status and impacts of METRO operational changes and Bristol-Myers Squibb pretreatment impacts on plant performance including, at a minimum, a facility-wide mass balance for phosphorus and ammonia.

By April 1, 1999, the County will prepare a final report for submission to NYSDEC documenting the impacts of Bristol-Myers Squibb wastewater pretreatment and METRO operational changes on plant performance for phosphorus and ammonia removal. The report will include a statistical analysis of monitoring data collected over the 24-month period of January 1997 through December 1998. Based upon the results of this analysis, the County will evaluate the loading reductions accomplished, taking into account such factors as METRO flow conditions in relation to SPDES permit flow capacity, Bristol-Myers Squibb operating conditions in relation to industrial wastewater discharge permit conditions, and the removal of METRO tankage and equipment from service for necessary emergency maintenance or repairs. Seasonal loading reductions will be evaluated for ammonia.

By July 1, 1999, the NYSDEC will propose a modification to the SPDES permit in accordance with Uniform Procedures Regulations (6 NYCRR part 621) to adjust effluent limits for phosphorus and ammonia to levels achievable by the METRO plant.

c. **SPDES Modification - Intermediate Improvements.** Table 5-2 summarizes proposed SPDES permit effluent limitations which will serve as the basis of design for intermediate METRO improvements. As shown in Table 5-2, the design of intermediate METRO improvements will be based on attaining compliance with seasonal maximum monthly average effluent ammonia limits of 2 mg/l (as NH_3) for the period of May though October and 4 mg/l (as NH_3) for the period of November through April. As previously discussed in Chapter 2, these limits were proposed by NYSDEC based on consideration of water quality projections made using the approved UFI water quality models for Onondaga Lake, as well as the HydroQual, Inc. model results. Upon the completion of ammonia removal facilities at METRO, monitoring of ammonia concentrations in Onondaga Lake will be performed to assess the status of compliance with the ambient water quality standards and the need for more stringent effluent limits. In addition, acute and chronic toxicity testing of the METRO effluent will be performed.

C. **Preliminary Site Plan and Process Flow Schematics.** Figures 5-1 and 5-2 present a preliminary site plan and process flow schematic for the proposed METRO upgrade. Wastewater treatment for flows up to 126.3 mgd will consist of raw sewage and grit removal, primary settling, integrated fixed-film activated sludge treatment for BOD and ammonia removal, seasonal disinfection by chlorination followed by effluent dechlorination and post-aeration, and tertiary settling for effluent polishing. Phosphorus removal will be accomplished by chemical precipitation using metal salts (ferric chloride, ferrous chloride, ferrous sulfate, and/or alum) with flexibility provided for single- or multiple-point addition to primary settling, secondary settling, and tertiary settling facilities.

Wastewater treatment for incremental flows in excess of 126.3 mgd will consist of raw sewage screening and grit removal, primary settling, and seasonal disinfection by chlorination consistent with current operating practice.

Sludge treatment will consist of gravity sludge thickening, anaerobic sludge digestion, and belt filter press sludge dewatering. Dewatered sludge will continue to be treated by the N-Viro soil process prior to ultimate distribution for beneficial use.

D. **Unit Process Sizing and Design Criteria.**

1. **Upgrade for Year-Round Ammonia Removal.**

a. **Elements of Ammonia Removal Upgrade.** The proposed plan for upgrading of METRO for year-round removal of ammonia involves the use of fixed-film media to supplement the ammonia removal capabilities of the existing conventional activated sludge system. Major elements of the proposed ammonia removal upgrade include:

1) Expansion of secondary clarifier tankage to reduce hydraulic overflow rates in accordance with current design standards for activated sludge systems designed for ammonia removal.

2) Expansion of return sludge pumping capacity in accordance with current design standards for activated sludge systems designed for ammonia removal.

3) Structural modifications to the existing aeration tanks for conversion from complete mix to plug flow hydraulics with capability for step feed operation.

4) Replacement of existing mechanical surface aerators, which are approaching the end of their useful life, with a new energy-efficient fine bubble diffused aeration system.

5) Installation of fixed-film media in the aeration tanks as necessary to supplement ammonia removal capabilities for compliance with seasonal maximum monthly average effluent ammonia limits of 2 mg/l (as NH_3) for May through October and 4 mg/l (as NH_3) for November through April.

Table 5-3 summarizes preliminary design criteria for the proposed IFAS ammonia removal system.

b. **Phased Implementation of Ammonia Removal Upgrade.** Implementation of the proposed ammonia removal upgrade will be accomplished in three steps:

(1) optimization of ammonia removal performance using existing facilities; (2) demonstration of ammonia removal performance capabilities of conventional and integrated fixed-film activated sludge technologies following upgrade of one quarter of the METRO plant; and (3) full-scale upgrade of METRO based on the results of the demonstration project. Implementation of industrial wastewater pretreatment at Bristol-Myers Squibb is expected to increase ammonia removal rates at METRO by reducing influent pollutant loadings and by changing wastewater characteristics (i.e., by reducing wastewater BOD_5:TKN ratio). Onondaga County will implement interim actions to optimize the ammonia removal capabilities of existing facilities:

1) Changes in activated sludge system process control strategies to optimize ammonia removal by maximizing (to the extent possible) solids retention time. Solids retention time is limited by the hydraulic and solids loading characteristics of the secondary clarifiers.

2) Increased performance monitoring to prepare a plant-wide mass balance for ammonia which will be used to assess the relative importance of sludge sidestreams (gravity thickener overflow and belt press filtrate) and hauled waste receiving practices on ammonia removal.

3) Modifications to provide flexibility for chlorination of return activated sludge to control potential activated sludge bulking problems associated with operation for ammonia removal.

4) Expansion of anaerobic sludge digestion capacity by conversion of the existing secondary digester for use as a primary digester. This action is expected to result in improved sludge dewaterability and reduced belt press filtrate recycle pollutant loadings by virtue of improved sludge digestion.

5) Evaluation and potential construction of mechanical sludge thickening facilities to address the anticipated adverse impact of ammonia removal operation on gravity sludge thickening. This action is anticipated to result in reduced thickener overflow recycle pollutant loadings.

6) Installation of instrumentation (such as dissolved oxygen meters and clarifier sludge blanket level detectors) and replacement of the outdated METRO digital computer system to provide adequate monitoring and process control capabilities for operation for ammonia removal.

As discussed in Chapter 3, the interim improvements are expected to increase the ammonia removal capabilities at METRO. Secondary clarifier limitations related to hydraulic loading rates, solids loading rates, and sidewater depth, along with return sludge pumping capacity limitations, may impact ammonia removal performance and capabilities. The limitations of the secondary clarifiers are likely to be particularly evident during and following wet weather conditions when excessive solids loss to the secondary settling tank effluent may result in nitrifier washout.

Following optimization of the ammonia removal performance of existing facilities, an ammonia removal demonstration project will be conducted. The ammonia removal demonstration project will involve modifications to one quarter of the METRO plant to evaluate the performance capabilities of conventional activated sludge technology (with correction of secondary clarifier capacity limitations) and the need for fixed-film media to supplement ammonia removal capabilities. In particular, the response of conventional and IFAS systems to rapid changes in flow conditions resulting from the combined sewer service area and to seasonal changes in wastewater temperature conditions will be evaluated. The proposed demonstration of IFAS technology is consistent with current design practice for IFAS systems (USEPA, 1993). Based on the results of the ammonia removal demonstration project, final design criteria will be developed for the full-scale ammonia removal upgrade.

In the event that the ammonia removal demonstration project indicates that compliance with the proposed SPDES permit effluent limitations for ammonia cannot be achieved using IFAS technology, the County will conduct an evaluation of alternative ammonia removal solutions, including the use of conventional activated sludge technology, sidestream treatment, and influent flow diversion.

The phased implementation plan will provide an opportunity to maximize reuse of existing process tankage to the fullest extent possible, and thereby minimize costs necessary for additions and modifications. The use of fixed-film media to supplement the capacity and performance of existing activated sludge systems is a well-established concept. The filter media provide additional surface area for the growth of biological microorganisms responsible for BOD and ammonia removal. This effectively increases biological solids retention time, which is of prime importance to ammonia removal due to the relatively slow growth rate of nitrifying microorganisms without increasing suspended growth MLSS concentrations.

c. **IFAS Technologies.** IFAS systems may be divided into four categories as follows:

1) Free-floating pad media systems.
2) Cord media systems.
3) Trickling filter media systems.
4) Rotating biological contactor media systems.

A brief description of these various systems is provided in the following paragraphs.

1) **Pad Media Systems.** IFAS systems that utilize free-floating pad media include the Captor system marketed by PWT Waste Solutions, Inc. and the Linpor systems marketed by the Lotepro Corporation. Captor and Linpor media are similar in that they consist of freely moving porous sponge cubes, which are retained within the aeration tank by wire mesh screens. The wire mesh screens may be installed across the openings in baffles and prevent the cubes from being washed out of the aeration tanks to the clarifiers. Linpor media consist of ½-inch sponge cubes, whereas the Captor media consist of sponge cubes measuring approximately 1 inch by 1 inch by ½ inch. Pore sizes in the Linpor media are smaller than those in the Captor media.

Air lift pump systems must be provided to recycle the freely suspended media from the effluent and of the aeration tank back to the influent end. In addition, mechanical equipment must be installed to periodically squeeze the sponges to maintain their buoyancy and prevent clogging of the pores by excessive biological growths. This may be as simple as circulating the sponge cubes through a pump. The wire mesh screens used to retain the media within the aeration tank must be kept relatively clean and are typically provided with air knife system for this purpose.

Wear and tear of the sponge cubes are a concern for both the Captor and Linpor media. Based on current experience, loss of media can average between 3 to 6 percent per year requiring continual supplementation of the media.

Bench-scale studies conducted at Virginia Polytechnic Institute (VPI) have shown that the Linpor media is effective in maintaining nitrifying bacteria within the pores of the sponge cubes. Higher level organisms, including protozoans, appear to be excluded from the pores. This reduces the extent of predation of nitrifiers, but may increase sludge production slightly.

Construction of an IFAS system employing Captor media was completed in 1989 at the 3 mgd Moundsville/Glen Dale wastewater treatment facility, located in Moundsville, WV. Startup and performance experience from this installation were reported in a paper presented at the 46th Annual Meeting of the Virginia Water Pollution Control Association in April 1992 (Vaughn and Bonar, April 1992). Performance data summarized in the paper indicates that the plant is capable of achieving an average effluent ammonia concentration of 2 mg/l, well within the plant's permit limit of 15 mg/l.

Another IFAS system using Captor media is installed at a 2.5 mgd municipal wastewater treatment facility serving Opelousas, LA. Unlike the Moundsville plant, which achieves ammonia removal from primary settling tank effluent, the Opelousas installation is designed for separate-stage nitrification of secondary effluent and does not include a final clarifier. Performance data from this installation are inconclusive due to underloaded conditions (Golla et al., September 1992).

Results of a pilot-scale study performed to investigate the cold weather performance of Captor media for nitrification were reported in a paper presented at the 46th Purdue Industrial Waste Conference in May 1991 (Golla and Lin, 1992). A Captor pilot test unit was installed at the municipal wastewater treatment facility serving Vesper, WI in November 1988 to demonstrate winter ammonia removal from aerated lagoon effluent. Results of the pilot study demonstrated that nitrification performance was not impaired by wastewater temperatures as low as 10°C. Nitrification performance gradually decreased as wastewater temperatures decreased from 10°C to 0°C. Comparison of nitrification rates achieved by the Captor pilot unit over the temperature range of 0° to 10° with nitrification rates published in the literature for conventional suspended and attached growth wastewater treatment systems indicated higher rates for the Captor system.

At present, there are no full-scale installations of IFAS systems using Linpor media in the U.S. However, 23 installations reportedly exist in Europe, Japan, and Australia. Of these systems, 15 are designed for ammonia removal. The largest nitrification facility is at Aachen-Eilendorf, Germany and serves a population equivalent of 130,000.

2) **Cord Media Systems.** IFAS systems utilizing cord media include Ringlace media marketed by Ringlace Systems. Ringlace media is manufactured from a material similar to nylon, which is looped, threaded into strands, and mounted on aluminum racks for installation into an aeration tank. The installation of Ringlace media requires the use of a diffused aeration system to avoid excessive sloughing of the biomass growing on the media. Air bubbles rising between the racks of Ringlace media create currents which carry dissolved oxygen to the biofilm.

A full-scale pilot study using Ringlace media was conducted at the 10 mgd Annapolis wastewater treatment plant in Annapolis, MD during 1993. The purpose of the pilot study was to develop design criteria for single-stage nitrification and denitrification using Ringlace media installed in an IFAS system. Design of the system was to provide compliance with an effluent limit for total nitrogen of 8 mg/l on a year-round basis. Results of the pilot study were published in a paper presented at the 66th Annual Conference of the Water Environment Federation in October 1993 (Sen et al., October 1993). The information developed from the pilot study was incorporated into the design of a full-scale IFAS system for the Broadwater wastewater treatment plant operated by Anne Arundel County, MD, and will be incorporated into final design of the Annapolis plant upgrade as well.

Based on the pilot study results at Annapolis, precautions must be taken to prevent excessive growth of nematodes on the Ringlace media. The nematodes reduce sludge production via predation (a benefit), but also reduce the population of nitrifying bacteria on the media (a disadvantage). A successful means of controlling nematode populations involves division of the aeration tank into multiple cells containing Ringlace media with provisions to periodically provide anaerobic conditions in individual cells for durations of 24 to 48 hours.

Pilot testing of a Chinese cord media system similar to Ringlace has been conducted by New York City in connection with nitrogen removal goals developed for wastewater discharges to Long Island Sound. In addition, the Water Research Centre in Ontario, Canada is presently conducting a demonstration project to evaluate the effectiveness of fixed-film media to enhance ammonia removal within existing aeration tanks at municipal wastewater treatment facilities. The first phase of this demonstration project which is ongoing involves side-by-side testing of Ringlace media with an alternative fixed-film cord media system developed by Biomatrix Technologies.

3) **Trickling Filter Media Systems.** An example of IFAS systems which utilize trickling filter-type media is the KALDNES system marketed by Purac Engineering, Inc. The KALDNES system is a moving bed system similar to the pad media systems (i.e., Captor and Linpor), which utilize polyethylene trickling filter-type media. The media which are approximately 8 mm long and 10 mm in diameter are retained in the aeration tanks by wire mesh screens.

An installation list available from Purac Engineering lists 11 full-scale municipal wastewater applications of the KALDNES process constructed in Norway, Sweden, and Hungary over the period of 1990 to the present. Of these installations, five applications involved nitrogen removal, the largest being a facility constructed for Lillehammer, Norway in 1994 which serves a population equivalent of 70,000.

4) **Rotating Biological Contractor (RBC) Media Systems.** An IFAS system which involves the use of RBC media to enhance the performance of activated sludge systems is the SURFACT process marketed by Envirex, Inc. The SURFACT media consists of high density polyethylene RBC media. The RBC media are partially submerged in an aeration tank to provide surface area for biological growth.

2. **Upgrade for Permanent Phosphorus Removal.** Phosphorus removal is presently accomplished by chemical precipitation using temporary chemical storage and feed facilities which were installed in the sludge recycle buildings at METRO in 1986 after the announced closure of the AlliedSignal Corporation. Replacement of the temporary facilities is necessary for compliance with New York State regulations for bulk chemical storage facilities which require the installation of secondary containment systems for existing above-ground chemical storage tanks by December 22, 1999.

A preliminary basis of design for permanent phosphorus removal facilities is summarized in Table 5-4. In accordance with current design standards for municipal wastewater treatment facilities, permanent phosphorus removal facilities proposed for METRO will provide flexibility for use of alternate chemicals (ferric chloride, ferrous chloride, ferrous sulfate, and alum) and alternate chemical feedpoints (single or dual point chemical addition to primary settling and/or secondary treatment). This flexibility will provide the plant staff with the opportunity to minimize operating costs by using the most economical combination of chemical and feedpoints.

Based on current design standards, storage capacity for a minimum of 10 days chemical supply is required (Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Managers, 1990). To meet this requirement, a total storage volume of 80,000 gallons is proposed. As shown in Table 5-4, this volume will provide greater than 10 days' storage capacity for ferric chloride, ferrous chloride and alum based on a typical dosage of 1.5:1 molar ratio (USEPA, Sept. 1987).

3. **Upgrade for Effluent Dechlorination.** SPDES permit effluent limitations for METRO require seasonal wastewater disinfection from April 1 through October 15 for compliance with effluent limitations and ambient water quality standards for bacteria. Wastewater disinfection is accomplished at METRO by chlorination. Upgrading of the chlorination system is now required for compliance with the proposed SPDES permit effluent limit of 0.1 mg/l for chlorine residual.

The proposed plan for upgrading of METRO to achieve compliance with the proposed effluent limit for chlorine residual involves the construction of dechlorination and post-aeration facilities in conjunction with the full-scale METRO upgrade for ammonia removal. Dechlorination will be accomplished using sulfur dioxide, the most common dechlorinating agent used in municipal wastewater treatment practice. Post-aeration will be provided to restore dissolved oxygen concentrations depleted as a result of sulfur dioxide addition.

As discussed previously, four new secondary clarifiers will be constructed in connection with the METRO upgrade for ammonia removal. The wastewater flow from the aeration tanks will be split equally to the existing and new secondary clarifiers. The reduced flow through the existing clarifiers will allow for modifications of the existing chlorine contact tanks for dechlorination and post-aeration. New chlorination, dechlorination, and post-aeration tanks will be constructed for the flow from the new secondary clarifiers.

Table 5-5 summarizes preliminary design information for the proposed chlorination, dechlorination, and post-aeration facilities. Facilities design will include upgrade of the existing chlorine feed control system to a state-of-the-art control system to minimize quantities of chlorine and sulfur dioxide used.

4. **Demonstration Project - Hypolimnetic Oxygenation.** As discussed in Section 3.3C, the County will conduct a demonstration project, with monetary assistance and technical oversight by USEPA, to assess the technical feasibility and determine the costs and environmental impacts associated with hypolimnetic oxygenation for Onondaga Lake. The

scope of this demonstration project will be developed in consultation with USEPA and NYSDEC. The scope will focus on resolution of the concerns raised in connection with the conceptual design information and preliminary cost estimates developed by the U.S. Army Corps of Engineers for this alternative. The demonstration project will be performed in parallel with the proposed METRO interim improvements.

The results of the demonstration project will be used to determine full-scale design criteria. Onondaga County's participation in full-scale hypolimnetic oxygenation will be limited to the relative contribution of the METRO discharge to dissolved oxygen depletion in the hypolimnion. The magnitude of this contribution is yet to be quantified. Water quality model results indicate that only slight improvement of dissolved oxygen conditions can be expected in Onondaga Lake even with complete removal of the METRO discharge. Full-scale implementation of hypolimnetic oxygenation is anticipated to occur in conjunction with the implementation of METRO intermediate improvements. Further information of project scheduling is presented in Chapter 6.

E. **Treatment During Construction.** The implementation of proposed interim and intermediate METRO improvements will require partial interruption of wastewater treatment to accommodate construction activities. The most significant process interruption will involve the removal of aeration tanks from service for structural modifications scheduled as part of the one-quarter plant upgrade project and replacement of aeration equipment in all eight aeration tanks. During the design phase of the project, the County and their engineering consultant will work with NYSDEC to develop construction contract provisions which will require this work to be performed as expeditiously as possible so as to minimize the impacts on plant performance. The County will need to obtain an interim SPDES discharge permit in connection with this construction. The interim permit will require modification of the existing permit which requires full treatment for all wastewater flows up to 120 mgd. The removal of one aeration tank from service effectively reduces the peak flow capacity through full treatment by 15 mgd.

Other elements of the interim and intermediate METRO improvements will include process interruptions of shorter duration. For example, the full-scale plant upgrade will require process interruptions for construction associated with the conveyance of aeration tank mixed liquor flow to the proposed new nitrification settling tanks. The County and their consultant will work with the

NYSDEC and the construction contractor to develop a schedule for this work which will minimize the impact on plant performance.

F. Operation and Maintenance Requirements.

1. **Interim Phase.** The proposed interim phase METRO improvements scheduled between 1996 and 2000 include a new digital control system, new residual handling and odor control improvements, digester modifications, permanent phosphorus removal facilities, and increased level of water quality and biological monitoring of Onondaga Lake and its tributaries. These new facilities and the increased level of monitoring will require additional County personnel as follows:

New facilities at METRO:
1 - Wastewater treatment plant maintenance mechanic
1 - Wastewater treatment plant maintenance worker

Instrumentation and process control:
1 - Instrumentation mechanic
1 - Sanitary Engineer I

Water quality monitoring and regulatory compliance:
1 - Sanitary Engineer II
1 - Sanitary Engineer I
2 - Wastewater technicians
2 - Sanitary technicians

The above staffing will be a permanent requirement to operate and maintain these facilities and to ensure compliance with SPDES permit requirements. Direct costs associated with these projects include chemicals, electrical costs, maintenance equipment, and supplies, laboratory equipment and supplies.

2. **Intermediate Phase.** Proposed improvements for METRO in this phase include the one-quarter plant demonstration and full-scale upgrade for year-round nitrification at METRO. Additional County staffing required for this major upgrade at METRO is as follows:

Operation and maintenance:
4 - Wastewater treatment plant operators
1 - Wastewater treatment plant maintenance crew leader
1 - Wastewater treatment plant maintenance mechanic

1 - Wastewater treatment plant maintenance worker
1 - Wastewater treatment plant helper
1 - Instrumentation mechanic
2 - Wastewater treatment plant maintenance workers (I/E)

The above staffing will be a permanent requirement to operate and maintain the upgraded facilities at METRO. Direct costs will include an approximate 60 percent increase in electrical costs, increased chemicals, maintenance equipment, and supplies.

G. **Cost Estimates.**

1. **Project Costs.** Table 5-6 summarizes project cost estimates for interim and intermediate METRO improvements. Detailed project costs for individual projects are presented in Tables 5-7 through 5-12. All costs are indexed to an ENR Construction Cost Index of 5870 consistent with previous cost projections.

As shown, the total project cost for interim and intermediate METRO improvements is estimated at $153 million.

2. **Operation and Maintenance Costs.** Annual operations and maintenance costs were developed for elements of the proposed METRO upgrade. Summaries of these costs which include labor, maintenance materials, utilities, and chemicals are provided in Table 5-13. Labor costs are estimated based on present labor contract rates for operations and maintenance personnel. Utility and maintenance materials are estimated based on 1995 vendor and utility rate pricing. The cost of chemicals is estimated based on 1995 contract prices where applicable and pricing from chemical suppliers for chemicals not under contract. The costs summarized in Table 5-13 represent incremental costs to be added to the current operating and maintenance budget for METRO as a result of project implementation. As shown, the total incremental O&M cost for the proposed alternative is estimated at approximately $2.8 million per year.

a. **Rotary Drum Sludge Thickener.** Additional trained personnel will be required to maintain the new rotary drum sludge thickening units which operate continuously. The rotary drum thickening units will require additional power, maintenance parts, and polymer. The estimated costs for labor, maintenance materials, utilities, and chemicals polymer. The estimated costs for labor, maintenance materials, utilities, and chemicals are estimated at $8,800, $5,800, $20,000 and $11,000 respectively, resulting in a total cost of $45,600.

b. **Anaerobic Digestion Modifications.** Anaerobic digestion modifications will require estimated additional operations and maintenance costs of $84,800 due to the conversion of the existing gas holder to a primary digester. The conversion will add new equipment and instrumentation for mixing, heating, pumping, and process monitoring. Training of existing personnel will be required to operate and maintain the new equipment and instrumentation. It is expected the additional costs for labor, maintenance materials and utilities will be $34,300, $25,500, and $25,000.

c. **Permanent Phosphorus Removal.** The permanent phosphorus removal project will replace the present temporary chemical feed system with a new facility with improved pumping and chemical storage capabilities to meet present and projected flows and the new NYSDEC regulations for chemical storage. Increased requirements for pump control and instrumentation, as well as normal building maintenance, will require additional trained personnel. The labor costs are estimated at $61,000 with maintenance materials costs estimated at $6,700. Power and water costs are expected to be $5,000. Additional chemical requirements to treat an average daily flow of 84.2 mgd increase the O&M costs by an estimated $110,000. The total annual costs for this phase are $182,700.

d. **Secondary Clarifiers, Chlorination, and Dechlorination.** This project phase providing additional secondary clarifiers, chlorination tanks and new dechlorination tanks, equipment and chemicals is estimated to result in additional operation and maintenance costs of $802,500. The new requirements to dechlorinate and provide additional chlorination for increased flow capacity will require increased chemical usage estimated to cost $262,000. Labor and maintenance materials for the additional equipment will be $362,000 and $78,500 respectively. The increase in projected utilities costs is expected to be $100,000 annually.

e. **Fixed-Film Enhanced Nitrification.** The fixed-film enhanced nitrification program phase represents the largest incremental increase in operations and maintenance costs. The project will entail replacing the aging mechanical aeration system with a more energy efficient diffused aeration system having the state-of-the-art instrumentation controls. The aeration system will be designed for nitrification (ammonia removal) and will require fixed media to enhance nitrification in the aeration tanks. Approximately 5 percent of the media will require replacement annually. For these reasons the labor, utility, and maintenance materials are expected to increase $400,000, $320,000, and $680,000, respectively. The projected total incremental cost for operation and maintenance is estimated at $1,400,000.

f. **Hypolimnetic Oxygenation.** Incremental operation and maintenance costs for hypolimnetic oxygenation are presently unknown. An allowance for the County's share of hypolimnetic oxygenation has been included based on estimated operation and maintenance costs developed in connection with the hypolimnetic discharge alternative presented in the April 1994 draft MCP/DEIS document.

5.2 COMBINED SEWER OVERFLOW ABATEMENT FACILITIES

This section presents detailed information on the CSO abatement facilities previously described in Chapter 4 of the MCP. The general location of facilities and their respective groupings (interim or intermediate) are shown on Figure 5-3. The abatement program includes a mixture of approaches that have been selected to provide cost-effective abatement of CSO discharges. Principal projects and their benefits are summarized in Table 5-14.

The proposed interim and intermediate projects will result in compliance with applicable standards. Figure 5-4 illustrates the implementation schedule and the predicted response of lake bacteria concentrations to the different facilities. Lake floatables compliance is targeted for 1997. The buildout of the intermediate phase is targeted to achieve floatables compliance in Onondaga Creek by the year 2007. The reduction in floatables-impacted waterways achieved by the interim and intermediate phase CSO projects is illustrated on Figure 5-5.

A. **Site Plans and Design Criteria of Proposed Facilities.** Site plans have been developed for the interim and intermediate CSO abatement facilities. The hydraulic design of these facilities is based on the 1991 CSO Facilities Plan and subsequent work associated with the preparation of this Municipal Compliance Plan. The detailed hydraulic design of the Hiawatha RTF was completed by Environmental Engineering Associates, LLP and is the only facility to date that has reached this level of design.

1. **CSO Interim Demonstration Facilities.**

a. **Hiawatha RTF.** As noted above, engineering design associated with the proposed Hiawatha RTF has advanced beyond that provided in the CSO Facilities Plan. Final design of the pipelines and preliminary design of the treatment facilities associated with this project have been completed. The treatment facility itself has undergone preliminary design, and the basis of design included as Table 5-15. Additional design information for this facility can be found in the "Hiawatha Combined Sewer Overflow Regional Treatment Facilities, Preliminary Design Report," December 1995. The principal components of this project are discussed below.

1) **CSO Interceptor Sewer.** The proposed layout of the pipelines for the Hiawatha RTF is shown in Figure 5-6. This figure projects the layout of the CSO interceptor sewer, the underflow force main, and the outfall extension pipeline. The CSO interceptor sewer will extend along Hiawatha Boulevard to intercept wet weather flows and convey them to the RTF. The existing CSO 074 will be picked up at Spring Street and will be directed to the RTF. All CSO interceptor pipelines have been designed to transmit the one-year storm and can effectively accommodate the discharge of a five-year storm under surcharged conditions.

2) **Regional Treatment Facility.** The RTF site plan is shown on Figure 5-7. This facility will include an influent diversion structure, swirl concentrator, storage tank, and disinfection system using sodium hypochlorite. The facility will incorporate storage in either an in-line or off-line mode. A process flow diagram for this facility is included as Figure 5-8. An existing 54-inch storm sewer adjacent to this facility will allow the augmentation of stormwater flow from the combined

sewer area. This will allow evaluation of the treatment facilities at or above the design flow of 65 cfs for the one-year storm. Operation and/or design properties determined during the demonstration effort would provide the basis for final design of the remaining RTFs.

The volume of storage provided within the storage tank corresponds to one half of the one-year storm, as determined through long-term continuous simulation with the SWMM model. Finally, disinfection will be provided based upon a minimum of 5 minutes of contact at the peak facility discharge rate, followed by dechlorination based upon 30 seconds of contact time.

3) **Underflow Force Main and Outfall Extension Pipeline.** Layout of the underflow force main and the outfall extension pipeline are shown on Figure 5-9. The hydraulic profile of these facilities from the influent sewer to the discharge point to Ley Creek is shown in Figure 5-10.

The underflow pumps and force main have been designed to accept 6.5 cfs (10 percent of the peak influent rate of the swirl concentrator). SWMM modeling has shown that the storm sewer is capable of delivering flows up to the five-year storm. Accordingly, the outfall extension pipeline has been sized to accommodate the RTF discharge and the projected flow from the storm sewer that discharges through this area. Additional storm drainage from the Regional Market area will also be accepted within the outfall extension pipeline.

b. **Newell RTF.** The proposed layout for the Newell RTF is shown on Figure 5-11. The facility will include the existing swirl concentrator for floatables and solids removal followed by disinfection. The influent and effluent flow associated with this facility during a CSO event does not require pumping. However, during dry weather, pumping is required to prevent accumulation of standing water within the vortex unit. The basis of design for this facility is included as Table 5-16.

c. **Harbor Brook EquiFlow™.** The Harbor Brook EquiFlow™ demonstration facility is illustrated on Figure 5-12. As noted in Section 4.4, the facility will be constructed within the lake adjacent to the mouth of Harbor Brook. Several alternate layouts are possible for this facility; however, the proposed layout was developed to minimize the encroachment of the facility on AlliedSignal property. This layout, however, does not totally eliminate encroachment on other private or public properties. The City of Syracuse owns a significant portion of the offshore area where the facility has been proposed.

A pump station located in Cell 1 of the EquiFlow™ will be used to convey captured flow to METRO. The route of the force main passes under the Conrail tracks (Figure 5-12) through an existing 24-inch diameter pipeline that is currently used to convey waste bed runoff from the AlliedSignal lagoon to METRO. This pipeline will no longer be needed for its current purpose once AlliedSignal obtains a SPDES permit for direct discharge of waste bed runoff to NineMile Creek.

The channels, passageways, and flow control structures within the EquiFlow™ system will be sized to allow the passage of the one-year storm.

Two areas have been designated for demonstration of wetlands treatment technology for CSO and urban stormwater captured within the EquiFlow™ system. The on-shore area a will be used to demonstrate subsurface flow wetland treatment as shown in Figure 5-13. The in-water area will be used to demonstrate free water surface wetlands treatment as b shown on Figure 5-12. The goal of incorporating wetlands into the demonstration project is to experimentally develop a range of pollutant removal efficiencies.

The principal design variables for these facilities are the storage volume provided for capture of CSO and urban runoff and the rate at which this flow will be pumped back to METRO for subsequent treatment. The volume for this facility was established via SWMM modeling of the combined sewer system and storm sewer systems in the lower reaches of Harbor Brook, using the criteria of one half of the one-year storm volume as determined through long-term simulation. Other aspects of the basis of design are presented in Table 5-17.

d. **EBSS Storage Upgrade.** Principal elements associated with the upgrade of the EBSS storage system include:

1) Construction of aboveground sluice gate control structures for Gate Chambers 2, 3, and 4 as shown on Figure 4-6.

2) Construction of an inflatable dam on the Burnet Avenue trunk sewer to allow control of the flow from this sewer to the EBSS.

3) Replacement of all instrumentation and installation of a Supervisory Control and Data Acquisition System (SCADA) system.

Three sluice gates on the EBSS establish maximum pool elevations as shown on Figure 4-6. The SCADA system, through its connected rain gauges and level sensors on tributary CSO points, will determine when an overflow event begins and will close gates 1, 3 and 4. Gate chamber 2 (on the regulator sewer that connects EBSS to the MIS) will operate based on the water level in the MIS. At the end of an overflow event, Gate Chamber 2 will open to dewater the facility. Stored volume behind Gate Chamber 1 will be dewatered first. Following the dewatering of Gate Chamber 1, the slide gate in Gate Chamber 3 will open, allowing this stored volume to flow into the lower chamber. Gate Chamber 1 will be closed until the end of the event. Finally, the volume stored behind Gate Chamber 4 will be released to the MIS. Upon final dewatering of the system, Gate Chamber 1 will open and the system will return to standby mode. The basis of design for this facility is included as Table 5-18.

2. **CSO Interim Floatables Control Measures.**

a. **Harbor Brook Floatables Control Device.** The site plan for the Harbor Brook floatables facility is shown on Figure 5-12. This facility will be an in-line netting device comprised of several nylon mesh bags extending across the stream channel. The facility will be located downstream of the Hiawatha Boulevard bridge over Harbor Brook and will capture in-stream floatables upstream of the EquiFlow™ system. The floatables control facility will be designed for a peak hourly flow rate of 230 cfs based on the mean annual peak flow for Harbor Brook. The basis of design for this facility is included as Table 5-17.

Routine maintenance will include replacement of the nylon bags as needed. Captured floatables will be transported to the Onondaga County Resource Recovery Agency for final disposal.

b. **Teall Brook FCF.** The Teall Brook FCF will control the discharge of floatables originating from CSO 073 in addition to a storm sewered area. The site plan for the proposed combined outfall is illustrated on Figure 5-14. The existing stone-lined channel will be modified with the construction of headworks and an overflow weir arrangement. The weir will create a temporary pool to decrease the flow velocity within the floatables netting device. The facility will be covered to minimize odors and aesthetic impacts.

Teall Brook FCF will be located at the origin of Teall Brook which is the outlet of the 60-inch sewer that runs north along Teall Avenue. The FCF is designed for a flow rate of 265 cfs or approximately the one-year storm. The facility will be provided with a controlled diversion in the event of blockage or other failure of the netting device. Other aspects of the design are summarized in Table 5-19.

c. **Hiawatha RTF.** The Hiawatha RTF includes floatables control facilities for abatement of CSO discharges to Ley Creek. Floatables entrapped behind the baffle in the vortex device will be pumped to METRO through the Ley Creek force main following an overflow event. The basis of design for the Hiawatha RTF is included as Table 5-15.

d. **Onondaga Creek Floatables Control Boom.** The site plan for the Onondaga Creek floatables control boom is shown on Figure 4-7. This facility will control floatables from CSOs within the Onondaga Creek basin until completion of the proposed RTFs and FCFs during the Intermediate phase.

The lower portion of the Creek downstream of the Kirkpatrick Street bridge will be modified to accommodate an FCF. This section will be widened and the existing submerged weir wall will be replaced with a new upstream weir wall. This modification will allow for a more quiescent section to collect floatables.

A modified boom system in the extended section will be used to collect floatables into a secluded containment structure where the floatables will be collected at regular intervals by maintenance personnel. Captured floatables will be transported to the Onondaga County Resource Recovery Agency for final disposal.

It is estimated that this facility will provide effective floatables removal up to 960 cfs and remove a significant portion of floatables up to 1,500 cfs. The mean annual peak flow for Onondaga Creek is approximately 2,000 cfs. Other aspects of the design can be found in Table 5-20.

3. **CSO Intermediate Regional Treatment Facilities and Interceptor Sewers.**

a. **Midland RTF.** The consolidation of CSO discharges within the Midland service area will require the construction of large-diameter CSO transmission pipelines; such pipelines will be designed to transmit, at a minimum, the peak discharge of the one-year storm. The planned route and profile of these facilities have been shown on Figures 5-15 through 5-18. There will be two major pipelines tributary to the Midland RTF. The first is the Midland Area CSO transmission pipeline that would intercept CSOs 043, 044, 060, 052, 062, and 076. These are the principal overflow points that exist south of the facility. The second pipeline is the Tallman Street transmission pipeline, which would intercept CSO 039, located north of the facility. Additionally, a transmission line is planned to intercept the flow from CSO 042, which is across Onondaga Creek from the proposed Midland RTF. There are a number of small CSO basins in this area that would not be connected to any proposed CSO transmission pipeline. Abatement of these CSOs will be accomplished through sewer separation (CSOs 045, 046, 047, 050, and 051). The significant storage volume within the proposed CSO transmission pipelines will be available to attenuate the peak influent rate to the vortex treatment units and the disinfection process, thereby increasing overall efficiency.

The Midland RTF, as shown schematically in Figure 4-9, will incorporate coarse screening followed by influent pumping. CSO discharges would be treated via a vortex device to remove floatables and gross solids and then be disinfected to reduce bacteria discharges to Onondaga Creek and the Lake. Pumping capacity will be provided to treat the maximum flow that can be delivered to the RTF.

The basis of design for different components of the Midland RTF is presented in Table 5-21. The peak swirl influent rate has been established at 650 cfs, corresponding to a one-year design storm. Two 61-foot diameter vortex devices will be required for this design flow. All pipelines and other components of this facility will be sized to accommodate the peak discharge of a one-year storm as well.

b. **Clinton RTF.** The Clinton RTF is located at the abandoned Clinton Station railroad yard, approximately 200 yards to the south of the Armory on Jefferson Street. This facility will provide treatment of CSO discharges from the central portion of the City of Syracuse. This facility would also allow treatment of local CSO discharges and control of excess surcharge of flows on the MIS.

There are four principal CSO transmission pipelines associated with this RTF:

1) **Clinton Street (Figure 5-19).** The proposed Clinton Street CSO transmission pipeline originates at CSO 034 and extends northward approximately 600 feet to the proposed RTF. In addition to the CSO 034 connection, a short section of 72-inch diameter pipe to tap the MIS in the vicinity of Clinton Street is planned. The Onondaga Street CSO transmission pipeline would also be tributary to this sewer at Dickerson Street.

2) **West Street (Figure 5-20).** The proposed West Street CSO transmission pipeline will originate at Walton Street (CSO 028) and extends southward to Tully Street (CSO 032). Along its course, it will pick up wet weather flow from West Jefferson Street (031). It will cross Onondaga Creek via two 36-inch diameter inverted siphon pipes and then extend eastward to its connection with the Jefferson Street CSO transmission pipeline.

3) **Onondaga Street (Figure 5-21).** This pipeline has been designed to intercept and convey the discharge of CSOs 033, 035 and 036 to the Clinton RTF. The proposed pipeline will originate at Onondaga Street and extend to McCormick Street, where it will be directed eastward on Dickerson Street. The pipeline will then cross Onondaga Creek via twin 36-inch inverted siphons and discharge to the Clinton Street pipeline.

4) **Jefferson Street (Figure 5-22).** The proposed Jefferson Street CSO transmission pipeline will originate at the Fayette Street trunk sewer (CSO 027) and extend southward along South Franklin Street. At the Armory, it will be directed westward and will intercept CSO 030 at Jefferson Street before crossing under the elevated railroad tracks. Once on the west side of the elevated railroad tracks, it will be directed southward to the headworks of the RTF.

All CSO proposed transmission pipelines will be sized to transmit the peak flow rates associated with a one-year storm. Their diameter and length is sufficient to also provide storage of CSO discharges during small overflow events.

The proposed RTF, shown schematically on Figure 4-10, will be designed on the basis of a 90 percent storm and will include provisions to add a second vortex device to provide treatment up to the one-year storm. The design for the 90 percent storm will require the construction of one 48-foot diameter vortex device. The one-year design storm would require a second 48-foot diameter unit. The demonstration feed equipment will be sized on the one-year storm. Other aspects of the basis of design are found in Table 5-22.

c. **Sewer Separation.** Combined sewer areas recommended for sewer separation have been listed on Table 4-4 and shown on Figure 4-8. Detailed plans of individual basin separation have not been prepared. In most instances, sewer separation will be accomplished via the construction of a new sanitary collection system and the conversion of the former combined sewer into a storm sewer. In some cases, the combined sewer may be in poor condition or have inadequate capacity to handle the stormwater drainage needs of a particular area, necessitating construction of new sanitary and stormwater sewers.

4. **CSO Intermediate Floatables Control Facilities (FCF) and Interceptor Sewers.**

a. **Franklin FCF.** The Franklin FCF will require the construction of two short sections of CSO transmission pipelines, as shown on Figure 5-23. The Butternut Street and Burnet Avenue transmission pipelines connect to the trunk sewers of the same name. These transmission pipelines (sized for a one-year storm) will terminate within a structure into which a floatables control device will be built. Floatables and other coarse solids will either be trapped within a netting device or separated from the influent flow and pumped back into the MIS. A new outfall pipeline will be constructed for this facility. The basis of design for this facility is provided in Table 5-23.

b. **Maltbie FCF.** The pump well of the former Maltbie Street demonstration facility will be an excellent location to house the final FCF on the Onondaga Creek corridor. It will be fitted with a weir wall (similar to the Teall Brook FCF) and netting device. Entrapped floatables will be removed at regular intervals. The site plan for the Maltbie FCF is presented in Figure 5-24; the basis of design is included as Table 5-24.

B. **Operation and Maintenance Requirements.**

1. **Interim Phase.** The proposed CSO abatement facilities for the interim phase scheduled between 1996 and 2000 include three demonstration projects to identify and evaluate operational procedures for the subsequent intermediate-phased facilities. The demonstration projects will involve County personnel. These demonstration projects are the Hiawatha RTF with storage, the Newell disinfection demonstration, and the Harbor Brook FBM. Other interim phase projects that involve County personnel include the Erie Boulevard storage system upgrade and the Teall Brook FCF.

County staffing for these projects will be required as follows:

Pumping Station Operation and Maintenance
1 - Sewage Plant Maintenance Crew Leader
2 - Pump Station Maintenance Worker 2
2 - Pump Station Maintenance Worker 1

Instrumentation and Control
1 - Sewage Plant Maintenance Crew Leader
1 - Instrumentation Mechanic
1 - Maintenance Helper

Regulatory Compliance
1 - Sanitary Engineer

Direct costs associated with these projects generally include chemicals, electrical costs, maintenance equipment and supplies.

2. **Intermediate Phase.** Proposed abatement facilities that would require maintenance in addition to the interim facilities are the Midland RTF, the Clinton RTF, and the Franklin and Maltbie FCFs. The intermediate phase facilities are significantly larger than the interim phase facilities but are similar in their technology. Additional County staffing required for these facilities is as follows:

1 - Sewer Maintenance Crew Leader
1 - Sewer Maintenance Worker 2
2 - Sewer Maintenance Worker 1

The above staffing will be a permanent requirement to operate and maintain the CSO abatement facilities and to ensure SPDES compliance. This same staff will assist other personnel of the County in conducting effectiveness evaluations as required. Such evaluations are expected to be conducted during and following the intermediate phase buildout.

C. **Cost Estimates.**

1. **Project Costs.** Table 5-25 summarizes project cost estimates and evaluates costs associated with the CSO interim and intermediate projects. All costs are indexed to an ENR Construction Cost Index of 5870, consistent with previous cost estimates.

2. **Operation and Maintenance Costs.** Annual operations and maintenance costs were developed for elements of the proposed CSO abatement program. Summaries of these costs which include labor, maintenance materials, utilities, and chemicals are provided in Table 5-26. Labor costs are estimated based on present labor contract rates for operations and maintenance personnel. Utility and maintenance materials are estimated based on present utility rate pricing. The cost of chemicals is projected from the annual volume of CSO discharge to be treated under the interim and intermediate phases. The costs summarized in Table 5-26 represent incremental costs to be added to the current operating and maintenance budget for collection system maintenance as a result of project implementation. As shown, the total incremental O&M cost for the proposed alternative is estimated at approximately $722,000 per year.

5.3 WATER QUALITY ASSESSMENT PROGRAM

A key component of the phased TMDL strategy is monitoring of the receiving water to assess compliance with ambient water quality standards and progress towards attainment of designated uses. The County has conducted a water quality monitoring program for Onondaga Lake and its tributaries each year since completion of a baseline survey in 1970. Changes in the scope and organization of the County's annual monitoring program are proposed to reflect the needs of the phased TMDL strategy. In this section, the objectives of the annual monitoring program proposed for the duration of implementation of the MCP are summarized. Management and technical strategies to implement the objectives are presented, along with summary tables of the rationale for program design. Tables detailing the proposed program (specific sites, monitoring frequencies, chemical and biological parameters to be monitored, analytical procedures and limits of detection) are included as Appendix C-4.

The focus of the long-term monitoring program is twofold: assessment of compliance with ambient water quality standards in the lake and tributaries (Table 5-27), and measurement of progress towards resolution of the habitat and contamination issues affecting restoration of the biotic community (Tables 5-28 and 5-29). The proposed monitoring program includes physical and habitat issues, chemical water quality, and biological parameters. USEPA notes that measuring environmental progress is a "critical need and has become a key element of the Agency's strategic planning process" (USEPA, 1991). The effectiveness of METRO and CSO improvements and the need for additional controls beyond the interim and intermediate projects will be assessed through the long-term monitoring of "ecological integrity," as depicted in Figure 5-25.

The proposed effectiveness evaluation program to measure changes in lake water quality associated with CSO improvements is illustrated on Figure 5-26. Sampling locations, parameters, and targeted sampling periods are shown.

A. **Strategy to Implement Tributary, Lake, and River Monitoring Programs.**

1. Structure monitoring programs to collect data at the temporal and spatial scale required to assess compliance.

2. Expand long-term monitoring programs to include elements of ecological integrity (biomonitoring and habitat issues).

3. Incorporate sufficient flexibility so that monitoring and assessment of additional chemicals or potential sources can be done as needed.

4. Define monitoring as an internal priority at Department of Drainage and Sanitation; dedicate sufficient resources to enable necessary flexibility, responsiveness, and reporting requirements.

5. Increase participation of outside technical experts, such as the current County Lake Advisory Group, in the design and implementation of the monitoring program and the interpretation of results.

6. Utilize quality assurance/quality control procedures in the field and laboratory programs. Draw on guidance developed by NYSDEC and USEPA for use in documenting quality of data collected under state and federal hazardous waste programs.

7. Share findings with regulatory agencies on a regular (quarterly) basis.

B. Objectives of the Tributary Monitoring Program.

1. Quantify external loading of phosphorus, nitrogen, suspended solids, indicator bacteria, heavy metals, and salts. Utilize the software program FLUX to quantify external pollutant loadings, calculate the standard error of loading estimates, and continually refine the allocation of sampling resources to best estimate loads. Shift monitoring efforts from a scheduled to an event-based program to minimize the standard error of external load calculations.

2. Collect storm event data both upstream and downstream of the CSO discharges to Onondaga Creek and Harbor Brook

3. Gather data on an adequate temporal and spatial scale to assess compliance with ambient water quality standards.

4. Assess biological habitat in tributaries and measure improvements in response to CSO remedial measures. Measure and map sludge deposits in tributaries downstream of CSOs. Use the rapid field biotic index to assess changes to tributary macroinvertebrates.

5. Continue cooperative arrangements with USGS to gauge stream December 22, 1995 flows for the major lake tributaries. Work with USGS and Crucible Specialty Metals to improve flow estimates (and therefore loading estimates) of Tributary 5A.

C. Objectives of the Onondaga Lake Monitoring Program.

1. Gather data on an adequate temporal and spatial scale to assess compliance with ambient water quality standards, including bacteria concentrations in near-shore areas following storm events.

2. Assess the trophic status of the lake.

3. Evaluate trends in lake water quality over time and in response to remedial actions.

4. Complement the chemical monitoring program with biomonitoring to assess the densities and species composition of phytoplankton, zooplankton, macrophytes, macrobenthos, and fish.

5. Evaluate the success of fish propagation (quantitative lakewide nest surveys, recruitment estimates, and juvenile community structure) in the lake on an annual basis.

6. Establish data sharing protocols with the NYSDOH to enable the County to track contaminant burden in fish flesh.

7. Assess biological habitat in lake and monitor improvements in response to remedial measures.

8. Incorporate additional monitoring to test temporal and spatial variability in water quality.

D. **Objectives of the River Monitoring Program.**

1. Evaluate current water quality of the Seneca River and compliance with ambient water quality standards upstream and downstream of the Onondaga Lake outlet.

2. Evaluate the assimilative capacity of the Seneca River and quantify effects of the zebra mussels.

3. Concentrate river monitoring during critical conditions of warm weather and low stream flows.

4. Design monitoring to test temporal and spatial variability (for example, diurnal variations in river water quality, presence, and extent of chemical stratification).

TABLE 5-1

PRELIMINARY BASIS OF DESIGN[1]
INFLOW SEWAGE FLOWS AND LOADINGS
Municipal Compliance Plan
Onondaga County, New York

		BASIS OF DESIGN[2]	
	CURRENT CONDITIONS	INTERIM	TENTATIVE FINAL
Flow, mgd	78.6	84.2	84.2
BOD_5, mg/l BOD_5, lbs/day	200 130,000	136 95,200	136 95,200
TSS, mg/l TSS, lbs/day	210 140,000	192 134,700	192 134,700
Phosphorus, mg/l Phosphorus, lbs/day	4.3 2,800	4.1 2,880	3.8 2,670
TKN, mg/l TKN, lbs/day	35.0 23,000	27.2 19,110	26.3 18,460
Ammonia, mg/l (as N) Ammonia, lbs/day (as N)	20.0 13,000	19.1 12,550	17.3 12,170

(1) Flows and loadings shown represent 12-month rolling average conditions.

(2) Design influent phosphorus, TKN, and ammonia loadings will be by the performance of Bristol pretreatment facilities. Values shown represent attainment of interim and tentative final effluent limitations by Bristol.

TABLE 5-2

PRELIMINARY BASIS OF DESIGN
SPDES PERMIT EFFLUENT LIMITATIONS - OUTFALL 001
Municipal Compliance Plan
Onondaga County, New York

PARAMETER	AVERAGING PERIOD	LIMIT
Flow	12-month rolling average	84.2 mgd
$CBOD_5$ $CBOD_5$	30-day average 7-day average	25 mg/l 40 mg/l
TSS TSS	30-day average 7-day average	30 mg/l 45 mg/l
Phosphorus	12-month rolling average	400 lbs/day(1)
Ammonia	30-day average (May-October) 30-day average (November-April)	2 mg/l (as NH_3) 4 mg/l (as NH_3)
Coliform, fecal Coliform, fecal	300-day geometric mean 7-day geometric mean	200/100 ml 400/100 ml
Chlorine residual	Daily maximum	0.1 mg/l
pH	Range	6.0 - 8.5 SU
Settleable solids	Daily maximum	0.3 ml/l

(1) Phosphorus limit shown reflects initial SPDES cap which may be adjusted based upon plant performance results following the implementation of Bristol pretreatment and METRO interim improvements.

(2) Effluent disinfection is required seasonally from April 1 through October 15. Limits for fecal coliforms and chlorine residual apply to this period.

TABLE 5-3

PRELIMINARY BASIS OF DESIGN FOR FIXED-FILM ENHANCED NITRIFICATION
Municipal Compliance Plan
Onondaga County, New York

COMPONENT	PRELIMINARY BASIS OF DESIGN
PROCESS INFLUENT FLOWS AND CHARACTERISTICS [1]	
Sewage Flows	
Daily Average Flow, mgd	84.2 mgd
Peak Flow, mgd	126.3 mgd
Pollutant Concentrations and Loadings	
BOD_5, mg/l	88 mg/l
BOD_5, lbs/day	61,900 lbs/day
Suspended Solids, mg/l	67 mg/l
Suspended solids, lbs/day	47,100 lbs/day
TKN, mg/l	21 mg/l
TKN, lbs/day	14,800 lbs/day
Ammonia, mg/l as N	17 mg/l
Ammonia, lbs/day as N	12,200 lbs/day
PROCESS EFFLUENT REQUIREMENTS (MAXIMUM MONTHLY AVERAGE CONCENTRATIONS)	
$CBOD_5$, mg/l	25 mg/l
Suspended Solids, mg/l	30 mg/l
Ammonia, mg/l (as NH_3)	
Summer (May - October)	2 mg/l
Winter (November - April)	4 mg/l
AERATION TANKS	
Aeration Volume	1,476,800 CF (existing)
Hydraulic Retention Time	
Daily Average Flow Conditions (84.2 mgd)	3.1 hours
Peak Flow Conditions (126.3 mgd)	2.1 hours
Volumetric Loadings	
BOD_5	42 lbs/1,000 CF/day
TKN	10 lbs/1,000 CF/day

TABLE 5-3 (continued):

COMPONENT	PRELIMINARY BASIS OF DESIGN
AERATION SYSTEM	
Type	Fine Bubble Diffused Air
Oxygen Requirements	
Average	160,000 lbs/day
Peak	320,000 lbs/day
Number of Blowers	10 (including two standby)
Blower Size	600 HP
NITRIFICATION SETTLING TANKS	
Surface Area	
Existing (four units at 170-foot diameter and 11-foot SWD)	90,800 sq. ft.
New (four units at 140-foot diameter and 14-foot SWD)	61,575 sq. ft.
Surface Overflow Rate	
Existing Units	
Daily Average Flow Conditions (42.1 mgd)	460 gal/sq. ft./day
Peak Flow Conditions (63.15 mgd)	695 gal/sq. ft./day
New Units	
Daily Average Flow Conditions (42.1 mgd)	680 gal/sq. ft./day
Peak Flow Conditions (63.15 mgd)	1,025 gal/sq. ft./day
RETURN SLUDGE PUMPING	
Return Sludge Pumps	
Existing (including two standby units)	6 @ 11,000 gpm
New (including two standby units)	6 @ 11,000 gpm

[1] Based on chemical addition to primary settling for phosphorus removal.

TABLE 5-4

PRELIMINARY BASIS OF DESIGN
PERMANENT PHOSPHORUS REMOVAL FACILITIES
Municipal Compliance Plan
Onondaga County, New York

COMPONENT	PRELIMINARY DESIGN
INFLUENT PHOSPHORUS LOADING (DAILY AVERAGE)	2,670 lbs/day
ALTERNATIVE CHEMICALS	
Ferric Chloride (30 percent solution) Ferrous Chloride (20 to 25 percent solution) Ferrous Sulfate Alum (49 percent solution)	1.15 lbs Fe/gal 1.0 lbs Fe/gal 0.5 lbs Fe/gal 0.485 lbs Al/gal
CHEMICAL DOSAGE (MOLAR RATION FE OR AL:INFLUENT TP)	1 to 2 molar ratio
CHEMICAL FEED RATES	
Ferric Chloride Ferrous Chloride Ferrous Sulfate Alum	4,200 to 8,400 gpd 4,800 to 9,600 gpd 9,600 to 19,300 gpd 4,800 to 9,600 gpd
LIQUID CHEMICAL STORAGE TANKS	
Number Type Capacity (each) Total Storage Capacity	8 FRP 10,000 gallons 80,000 gallons
CHEMICAL METERING PUMPS	
Number Type	6 Diaphragm metering

TABLE 5-5

PRELIMINARY BASIS OF DESIGN FOR
EFFLUENT DECHLORINATION FACILITIES
Municipal Compliance Plan
Onondaga County, New York

COMPONENT	PRELIMINARY DESIGN
EFFLUENT CHLORINE CONTACT/DECHLORINATION TANKS	
Volume	
Existing Tankage (four @ 19.5 ft. W x 170 ft. L x 11 ft. SWD	145,860 CF
New Tankage	145,860 CF
Total	291,720 CF
Hydraulic Retention Time (Peak Flow = 126.3 mgd)	
Chlorine Contact Zone	15 minutes
Dechlorination/Post Aeration Zone	10 minutes
STORMWATER CHLORINE CONTACT/DECHLORINATION TANKS	
Volume	
Existing Tankage (two @ 31 ft. W x 100 ft. L x 20 ft. SWD	124,000 CF
New Tankage	62,000 CF
Total	186,000 CF
Hydraulic Retention Time (Peak Flow = 100 mgd)	
Chlorine Contact Zone	15 minutes
Dechlorination Zone	5 minutes
CHLORINE FEED EQUIPMENT	
Chlorine Dosage	
Main Effluent	6 mg/l
Stormwater Overflow (Primary Effluent)	15 mg/l
Number of Chlorinators	Four (including one standby)
Chlorine Feed Requirements	
Average	4,400 lbs/day
Peak	20,500 lbs/day
Chlorinator Capacity	8,000 lbs/day

TABLE 5-5 (continued):

COMPONENT	PRELIMINARY DESIGN
SULFUR DIOXIDE FEED EQUIPMENT	
SO_2 Dosage (based on 2 mg/l chlorine residual)	2 mg/l
Number of Sulfonators	Three (including one standby)
SO_2 Feed Requirements	
Main Effluent	
Average	1,400 lbs/day
Peak	2,100 lbs/day
Stormwater Overflow (Peak)	1,700 lbs/day
Sulfonator Capacity	4,000 lbs/day

TABLE 5-6

SUMMARY OF PROJECT COSTS
METRO IMPROVEMENTS
Municipal Compliance Plan
Onondaga County, New York

	PROJECT COST (ENR 5870)
Interim Improvements	
Digital system improvements	$2,900,000
Residuals handling and odor control improvements	7,500,000
Digester modifications and mechanical sludge thickening improvements	6,650,000
Other plant improvements	1,440,000
Permanent phosphorus removal facilities	2,400,000
Hypolimnetic oxygenation demonstration	Not available
Subtotal (Interim Improvements)	**$20,890,000**
Intermediate Improvements	
Acquisition of Niagara Mohawk property	Unknown
Relocation of sewer maintenance group	5,800,000
1/4-scale ammonia removal demonstration	32,700,000
Full-scale plant upgrade	73,800,000
Full-scale hypolimnetic oxygenation	20,000,000 *
Subtotal (Intermediate Improvements)	**$132,300,000**
TOTAL PROJECT COSTS	**$153,190,000**

* Allowance for full-scale hypolimnetic oxygenation based on projected cost for hypolimnetic discharge.

TABLE 5-7

PROJECT COST ESTIMATE
RESIDUALS HANDLING AND ODOR CONTROL IMPROVEMENTS
Municipal Compliance Plan
Onondaga County, New York

	ESTIMATED COST (ENR 5870)
Construction Costs	
Odor control system	$2,800,000
Residuals handling systems	
Screenings	600,000
Grit	2,600,000
Total Construction Cost	**$6,000,000**
Allowance for engineering, legal, and miscellaneous costs	$1,500,000
Total Project Costs	**$7,500,000**

Source: Blasland, Bouck & Lee, August 1994.

TABLE 5-8

PROJECT COST ESTIMATE
DIGESTER MODIFICATIONS AND MECHANICAL
SLUDGE THICKENING IMPROVEMENTS
Municipal Compliance Plan
Onondaga County, New York

	ESTIMATED COST (ENR 5870)
Construction Costs - Digester Improvements	
Sitework	$ 100,000
Structural/architectural modifications	440,000
Digester mixing system	470,000
Heat exchanger equipment	285,000
Gas holder cover	440,000
Process piping	100,000
Instrumentation and electrical modifications	70,000
Contractor overhead and profit	280,000
Subtotal	**$2,185,000**
Construction Costs - Mechanical Sludge Thickening	
Sitework	$ 120,000
Structural/architectural modifications	610,000
Rotary drum thickener equipment	970,000
Thickened sludge pumps	110,000
Polymer feed system	35,000
Process piping	200,000
Electrical and instrumentation	200,000
Heating and ventilation	100,000
Plumbing	40,000
Contractor overhead and profit	360,000
Subtotal	**$2,745,000**
Allowance for engineering, legal, and miscellaneous	$ 860,000
Allowance for contingencies	860,000
TOTAL PROJECT COSTS	**$6,650,000**

TABLE 5-9

PROJECT COST ESTIMATE
OTHER PLANT IMPROVEMENTS
Municipal Compliance Plan
Onondaga County, New York

	ESTIMATED COST (ENR 5870)
Construction costs	$ 960,000
Allowance for contingency	240,000
Allowance for fiscal, legal, and engineering costs	240,000
Total Project Costs	**$1,440,000**

TABLE 5-10

PROJECT COST ESTIMATE
PERMANENT PHOSPHORUS REMOVAL FACILITIES
Municipal Compliance Plan
Onondaga County, New York

	ESTIMATED COST (ENR 5870)
Chemical storage and feed buildings	$ 450,000
Chemical storage tanks	90,000
Chemical metering pumps	70,000
Chemical-resistant coatings	90,000
Fiberglass grating	30,000
Polymer feed system	170,000
Sump pumps	30,000
Process and yard piping	100,000
Sitework	200,000
Instrumentation	30,000
Contractor mobilization, plant startup, and general conditions	70,000
Total (General Construction)	**$1,330,000**
Electrical, heating and ventilating, and plumbing	270,000
Total Construction Cost	**$1,600,000**
Allowance for fiscal, legal, and engineering costs (25%)	400,000
Contingency allowance	400,000
Total Project Cost	**$2,400,000**

TABLE 5-11

PROJECT COST ESTIMATE
1/4-PLANT UPGRADE AND AERATION SYSTEM IMPROVEMENTS
Municipal Compliance Plan
Onondaga County, New York

	ESTIMATED COST (ENR 5870)
General Construction	
Aeration tank modifications	$3,250,000
Secondary clarifier and associated equipment	2,550,000
Fixed-film media	2,900,000
Blowers and diffused aeration equipment	2,450,000
Blower Building	1,000,000
Return and waste sludge pumping equipment	250,000
Process and yard piping	2,200,000
Sitework	2,800,000
Instrumentation	300,000
Contractor mobilization, plant startup, and general conditions	950,000
Subtotal (General Construction)	**$18,650,000**
Electrical, heating and ventilating, and plumbing	3,150,000
Total Construction Cost	**$21,800,000**
Allowance for fiscal, legal, and engineering costs	5,450,000
Allowance for contingencies	5,450,000
Total Project Cost	**$32,700,000**

TABLE 5-12

PROJECT COST ESTIMATE
FULL-SCALE METRO UPGRADE
Municipal Compliance Plan
Onondaga County, New York

	ESTIMATED COST (ENR 5870)
General Construction	
Secondary clarifiers and equipment	$ 8,800,000
Fixed-film media	19,000,000
Return and waste sludge pumping equipment	600,000
Chlorination, dechlorination, and post-aeration	3,000,000
Process and yard piping	3,300,000
Sitework	6,600,000
Instrumentation	700,000
Contractor mobilization, plant startup, and general conditions	2,200,000
Subtotal (General Construction)	**$44,200,000**
Electrical, heating and ventilating, and plumbing	5,000,000
Total Construction Cost	**$49,200,000**
Allowance for fiscal, legal, and engineering costs	12,300,000
Allowance for contingencies	12,300,000
Total Project Cost	**$73,800,000**

TABLE 5-13

OPERATION AND MAINTENANCE COSTS[1,2]
METRO IN-LAKE ALTERNATIVE
Municipal Compliance Plan
Onondaga County, New York

	LABOR	MAINTENANCE MATERIALS	UTILITIES	CHEMICALS	TOTAL
Rotary drum sludge thickening	$ 8 ,800	$ 5,800	$ 20,000	$ 11,000	$ 45,600
Anaerobic digester modifications	34,300	25,500	25,000		84,800
Permanent phosphorus removal	61,000	6,700	5,000	110,000	182,700
Secondary clarifiers/chlorination/ dechlorination	362,000	78,500	100,000	262,000	802,500
Fixed-film enhanced nitrification[3]	400,000	680,000	320,000		1,400,000
Hypolimnetic oxygenation[4]			Unknown	Unknown	Unknown
TOTALS	$901,500	$814,200	$570,000	$537,000	$2,822,700

(1) All costs are referenced to current 1995 dollars.

(2) Costs represent incremental operation and maintenance costs which are projected to be incurred upon the completion of construction of each project phase.

(3) An additional estimated operation and maintenance cost of $260,000 is anticipated for the proposed fixed-film enhanced nitrification pilot.

(4) Allowance based on prior estimate for hypolimnetic discharge. O&M cost for demonstration project is presently unknown.

TABLE 5-14

CSO ABATEMENT SUMMARY
Municipal Compliance Plan
Onondaga County, New York

BASIN	FACILITY	TREATMENT APPROACH	FLOATABLE CONTROL	BACTERIA	SOLIDS
Onondaga Creek	Floatables Boom	Floatables Boom	X		
	Newell RTF	Vortex and disinfection	X	X	X
	Midland RTF	Vortex and disinfection	X	X	X
	Clinton RTF	Vortex and disinfection	X	X	X
	EBSS	Storage	X [1]	X [1]	X [1]
	Franklin FCF	Floatables Netting	X		
	Maltbie FCF	Floatables Netting	X		
	Separation	Separation	X	X	X
Harbor Brook	EquiFlow™	Storage and pumpback	X	X [1]	X [1]
Ley Creek	Hiawatha RTF	Vortex, storage, and disinfection	X	X	X
	Teall FCF	Floatables Netting	X		

[1] CSO storage facilities will provide effective treatment up to the storage volume provided. CSO volumes in excess of storage volume will receive reduced treatment.

TABLE 5-15

HIAWATHA REGIONAL TREATMENT FACILITY (RTF)
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

SWIRL REGULATOR CONCENTRATOR	
Type	USEPA
Number of Units	1
Capacity	42 mgd (65 CFS)
Chamber Diameter D_2	29 feet
Inlet Dimension D_1	4 x 4 feet
Settleable Solids Recovery	90 percent
Floatables Recovery	Approximately 90 percent
STORAGE TANK	
Type	Circular concrete (aluminum dome)
Number of Units	1
Capacity	274,000 gallons (36,600 ft^3)
Diameter	57 feet
UNDERFLOW PUMPS	
Type	Submersible
Number of Units	2
Capacity per Unit	2,920 gpm (6.5 CFS)
Total Dynamic Head	49 feet
Pump Drives	35 HP (each)
Force Main Diameter	16 inches
COARSE SCREENS	
Type	Manually cleaned bar rack
Number of Units	1
Clear Opening	3 inches
Channel Width x Length	6 x 5 feet
DISINFECTION EQUIPMENT	
Type	Sodium hypochlorite
Dosage	12 mg/l
Number of Mixers	6
Mixer Drives	45 HP (7.5 HP per unit)
Chemical Storage	175 gallons
Basin Storage	160,500 gallons (21,450 ft^3)

TABLE 5-16

NEWELL STREET REGIONAL TREATMENT FACILITY (RTF)
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

SWIRL REGULATOR CONCENTRATOR (EXISTING)	
Type	USEPA
Number of Units	1
Capacity	6.5 mgd (10 CFS)
Chamber Diameter D_2	12 feet
Inlet Dimension D_1	2 feet
Settleable Solids Recovery	90 percent
Floatables Recovery	Approximately 90 percent
SWIRL REGULATOR CONCENTRATOR (NEW)	
Type	USEPA
Number of Units	1
Capacity	8.4 mgd (13 CFS)
Chamber Diameter D_2	16 feet
Inlet Dimension D_1	2 feet
Settleable Solids Recovery	90 percent
Floatables Recovery	Approximately 90 percent
UNDERFLOW PUMPS	
Type	Centrifugal Self Priming
Number of Units	2
Capacity per Unit	520 gpm
Total Dynamic Head	35 feet
Pump Drives	7.5 HP
Force Main Diameter	6 inches
COARSE SCREENS	
Type	Manually cleaned bar rack
Number of Units	2
Clear Opening	3 inches
Channel Width x Length	2 x 4 feet
DISINFECTION EQUIPMENT	
Type	Sodium hypochlorite
Dosage	10 mg/l
Number of Mixers	2
Mixer Drives	15 HP
Chemical Storage	550 gallons

TABLE 5-17

HARBOR BROOK EQUIFLOW™ DEMONSTRATION FACILITY
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

EQUFLOW ™ SYSTEM	
Capacity Number of Cells Average Depth Surface Area	13 million gallons 5 4 feet 10 acres
RETURN PUMPS (TO METRO)	
Type Number of Units Capacity per Unit Total Dynamic Head Pump Drives Force Main Diameter	Centrifugal submersible 1 9,030 gpm (20 CFS) 30 feet 100 HP 24 inches
FLOATABLE CONTROL DEVICE	
Type Number of Units Peak Flow-Through Capacity Number of Netting Units Dimension of Netting Units Floatables Recovery	In-line netting device 1 88 CFS (57 mgd) 2 2.5 x 2.5 x 8 feet (0.5-inch mesh) >90 percent
HOUSING STRUCTURE	
Type Number of Units Dimensions Capacity Emergency Bypass	Rectangular concrete (aluminum trap-door top) 1 10 x 30 feet 90 CF (6,700 gallons) Weir with baffle arrangement to impede floatables
FLOATABLES (BAG) REMOVAL	
Type Number of Units Weight Capacity of Boom Refuse Storage Capacity	Boom truck 1 1,000 lbs. 5 CY

TABLE 5-18

ERIE BOULEVARD STORAGE SYSTEM (EBSS) UPGRADE
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

STORAGE (EXISTING)	
Type Diameter - Length Capacity	In-line (existing conduits) 4.5 feet to 900 feet 8.0 feet to 900 feet 10.0 feet to 2,000 feet 10.5 feet to 6,200 feet 5 million gallons
CONTROL GATES (EXISTING)	
Type Number of Gates Control	Slide 4 gates Automatic (SCADA system)

TABLE 5-19

TEALL BROOK FLOATABLES CONTROL FACILITY (FCF)
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

FLOATABLES CONTROL DEVICE	
Type	In-line netting device
Number of Units	1
Peak Flow-Through Capacity	265 CFS (172 mgd)
Number of Netting Units	3
Dimension of Netting Units	2.5 x 2.5 x 8 feet (0.5-inch mesh)
Floatables Recovery	>90 percent
HOUSING STRUCTURE	
Type	Rectangular concrete (aluminum trap-door top)
Number of Units	1
Dimensions	15 x 40 feet
Capacity	1,800 CF (13,500 gallons)
Emergency Bypass	Weir with baffle arrangement to impede floatables
FLOATABLES (BAG) REMOVAL	
Type	Boom truck
Number of Units	1
Weight Capacity of Boom	1,000 lbs.
Refuse Storage Capacity	5 CY

TABLE 5-20

ONONDAGA CREEK FLOATABLES CONTROL FACILITY (FCF)
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

FLOATABLES CONTROL DEVICE	
Type Number of Units Flow-Through Capacity Dimension of Boom Floatables Recovery	Modified boom 1 1,500 CFS (970 mgd) 50 feet To be evaluated
FLOATABLES COLLECTION STRUCTURE	
Type Number of Units Dimensions Storage Capacity	Wood or block building 1 8 x 12 feet 5 CY
FLOATABLES REMOVAL FACILITY	
Type Number of Units Weight Capacity of Boom Refuse Storage Capacity	Boom truck 1 1,000 lbs. 5 CY

TABLE 5-21

MIDLAND REGIONAL TREATMENT FACILITY
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

SWIRL REGULATOR CONCENTRATOR	
Type	USEPA
Number of Units	2
Capacity per Unit	210 mgd (325 CFS)
Chamber Diameter D_2	61 feet
Inlet Dimension D_1	7.5 feet
Settleable Solids Recovery	90 percent
Floatables Recovery	Approximately 90 percent
INFLUENT LIFT PUMPS	
Type	Archimedes screw
Number of Units	9
Capacity per Unit	32,400 gpm
Screw Diameter	120 inches
Total Dynamic Head	19 feet
Pump Drives	250 HP
UNDERFLOW PUMPS	
Type	Centrifugal submersible
Number of Units	4
Capacity per Unit	7,300 gpm
Total Dynamic Head	35 feet
Pump Drives	100 HP
Force Main Diameter	36 inches
COARSE SCREENS	
Type	Manually cleaned bar rack
Number of Units	2
Clear Opening	3 inches
Channel Width x Length	16 x 18 feet
DISINFECTION EQUIPMENT	
Type	Sodium hypochlorite
Dosage	12 mg/l
Number of Mixers	9
Mixer Drives	15 HP
Chemical Storage	10,000 gallons

TABLE 5-22

CLINTON REGIONAL TREATMENT FACILITY
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

SWIRL REGULATOR CONCENTRATOR	
Type	USEPA
Number of Units	1
Capacity	149 mgd (230 CFS)
Chamber Diameter D_2	47 feet
Inlet Dimension D_1	7 feet
Settleable Solids Recovery	90 percent
Floatables Recovery	Approximately 90 percent
INFLUENT LIFT PUMPS	
Type	Archimedes screw
Number of Units	3
Capacity per Unit	34,400 gpm
Screw Diameter	120 inches
Total Dynamic Head	15 feet
Pump Drives	200 HP
UNDERFLOW PUMPS	
Type	Centrifugal submersible
Number of Units	2
Capacity per Unit	5,200 gpm
Total Dynamic Head	35 feet
Pump Drives	60 HP
Force Main Diameter	18 inches
COARSE SCREENS	
Type	Manually cleaned bar rack
Number of Units	2
Clear Opening	3 inches
Channel Width x Length	10 x 12 feet
DISINFECTION EQUIPMENT	
Type	Sodium hypochlorite
Dosage	12 mg/l
Number of Mixers	3
Mixer Drives	15 HP
Chemical Storage	6,000 gallons

TABLE 5-23

FRANKLIN FLOATABLES CONTROL FACILITY (FCF)
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

FLOATABLES CONTROL DEVICE	
Type	In-line netting device
Number of Units	1
Flow-Through Capacity	450 CFS (290 mgd)
Number of Netting Units	5
Dimension of Netting Unit	2.5 x 2.5 x 8 feet (0.5-inch mesh)
Floatables Recovery	>90 percent
HOUSING STRUCTURE	
Type	Rectangular concrete (aluminum trap-door top)
Number of Units	1
Dimensions	20 x 50 feet
Capacity	3,000 CF (22,450 gallons)
Emergency Bypass	Weir with baffle arrangement to impede floatables
FLOATABLES (BAG) REMOVAL	
Type	Boom truck
Number of Units	1
Weight Capacity of Boom	1,000 lbs.
Refuse Storage Capacity	5 CY

TABLE 5-24

MALTBIE FLOATABLES CONTROL FACILITY (FCF)
BASIS OF DESIGN
Municipal Compliance Plan
Onondaga County, New York

FLOATABLES CONTROL DEVICE	
Type	In-line netting device
Number of Units	1
Flow-Through Capacity	145 CFS (94 mgd)
Number of Netting Units	3
Dimension of Netting Unit	2.5 x 2.5 x 8 feet (0.5-inch mesh)
Floatables Recovery	>90 percent
HOUSING STRUCTURE	
Type	Rectangular concrete (aluminum trap-door top)
Number of Units	1
Dimensions	15 x 30 feet
Capacity	1,350 CF (10,100 gallons)
Emergency Bypass	Weir with baffle arrangement to impede floatables
FLOATABLES (BAG) REMOVAL	
Type	Boom truck
Number of Units	1
Weight Capacity of Boom	1,000 lbs.
Refuse Storage Capacity	5 CY

TABLE 5-25

CSO INTERIM AND INTERMEDIATE PROJECT COST SUMMARY
Municipal Compliance Plan
Onondaga County, New York

PHASE	PROJECT	TOTAL PROJECT COST	EVALUATION	TOTAL COST
Interim	Hiawatha RTF Demo	$7,172,000	$808,000	$7,980,000
	Newell RTF Disinfection Demo	745,000	568,000	1,313,000
	Harbor Brook EquiFlow™	4,689,000	754,000	5,443,000
	EBSS Storage Upgrade	1,850,000	400,000	2,250,000
	Kirkpatrick PS Upgrade	5,642,000		5,642,000
	Siphon Evaluation		330,000	330,000
	CSO Toxic Evaluation		300,000	300,000
	Floatables Entrapment			
	Teall Brook		175,000	175,000
	Onondaga Creek Broom		(By others)	
	Non-Point Data Collection		(By others)	
INTERIM SUBTOTAL				**$23,433,000**
Intermediate	Midland RTF	$74,535,000		$74,535,000
	Clinton RTF	30,185,000		30,185,000
	Franklin FCF	3,205,000		3,205,000
	Maltbie FCF	2,546,000		2,546,000
	Sewer Separation	8,704,000		8,704,000
	Effectiveness Evaluation		$1,500,000	1,500,000
INTERMEDIATE SUBTOTAL				**$120,675,000**
TOTAL CSO PROGRAM				**$144,108,000**

ENR = 5870

TABLE 5-26

CSO INTERIM AND INTERMEDIATE O&M COST SUMMARY
Municipal Compliance Plan
Onondaga County, New York

COMPONENT	ANNUAL INTERIM COST	ANNUAL INTERMEDIATE COST
Labor	$375,000	$540,000
Maintenance Materials	63,000	103,000
Utilities	13,000	22,000
Chemicals	4,000	57,000
TOTAL	$455,000	$722,000

TABLE 5-27

RATIONALE FOR ENVIRONMENTAL MONITORING PROGRAM DESIGN:
COMPLIANCE ISSUES
Municipal Compliance Plan
Onondaga County, New York

ISSUE	TRIBUTARIES	LAKE	RIVER
Compliance with ammonia and nitrite standards	Annual loads (METRO and natural tributaries) monitor concentration, flow, pH, and temperature.	Monitor concentrations biweekly (Mar-December) in upper and lower waters (also pH and temperature). Collect winter data.	Monitor concentrations upstream and downstream of Jacks Reef, Onondaga Lake outlet. Upper and lower waters. Summer low flow conditions (also pH and temperature)
Compliance with bacteria standards	Storm-event sampling upstream and downstream of CSOs to complement routine biweekly program.	Monitor near-shore areas for indicator bacteria following storms (six storms annually, May-September)	Not included
Compliance with oxygen standards	Low-flow conditions in CSO tributaries to complement routine biweekly program.	Biweekly profiles (March-December). Intense monitoring at fall mixing. Additional profiles as needed to support design and implementation of hypolimnetic oxygenation	Monitor concentrations upstream and downstream of Jacks Reef, Onondaga Lake outlet. Upper and lower waters. Summer low flow conditions. Two diurnal profiles annually during low flow
Compliance with total dissolved solids standards	Monitored during routine biweekly program	Biweekly profiles	Monitor concentrations upstream and downstream of Jacks Reef, Onondaga Lake outlet. Upper and lower waters. Summer low flow conditions.

TABLE 5-28

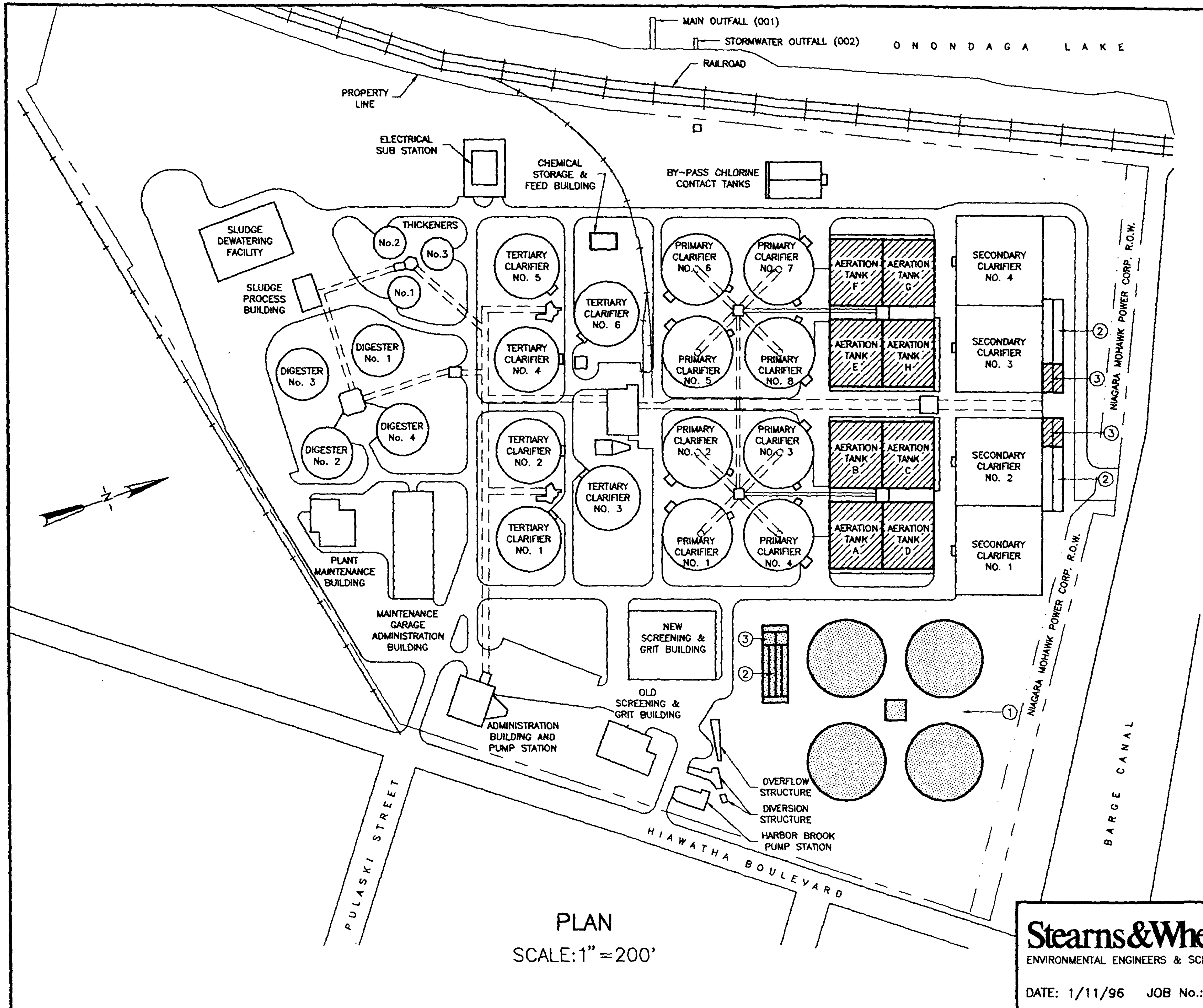
RATIONALE FOR ENVIRONMENTAL MONITORING PROGRAM DESIGN:
ECOLOGICAL INTEGRITY
Municipal Compliance Plan
Onondaga County, New York

ISSUE	PROGRAM
Fish habitat (lake)	Map macrophytes in Lake
	Monitor zooplankton numbers and size class
	Monitor zoobenthos (number and diversity)
Fish reproductive success	Nest surveys
	Larval counts
	Juvenile and adult population structure
Biotic habitat (tributaries)	Measure and map sludge deposits
	Rapid field biotic index
Fish contaminant burden	Cooperate with NYSDOH to obtain annual measurements of mercury, PCB and other organic contaminants in fish flesh

TABLE 5-29

RATIONALE FOR ENVIRONMENTAL MONITORING PROGRAM DESIGN:
LAKE TROPHIC STATE ASSESSMENT
Municipal Compliance Plan
Onondaga County, New York

PARAMETER	SIGNIFICANCE	MONITORING STRATEGY
Total P (TP)	Limiting nutrient for phytoplankton growth	Biweekly profiles April-November
Chlorophyll a	Indicator of primary production	Composite samples through photic zone, biweekly April - October
Soluble reactive P (SRP)	Limiting nutrient for phytoplankton growth.	Biweekly profiles April-November. Track SRP/TP ratio in response to hypolimnetic oxygenation
Dissolved oxygen profiles	Calculate areal hypolimnetic oxygen demand, support design of hypolimnetic oxygenation system	Weekly profiles April-November. Intense monitoring during fall mixing (see compliance table). Profile under ice.
Phytoplankton: abundance of major taxa	Continue long-term data set, track changes in response to remedial actions	Same as chlorophyll a
Zooplankton: abundance of major taxa	Size and abundance of zooplankton have major impact on food web, fishery management	Biweekly net tows through epilimnion (April-November), and entire water column as part of evaluation of hypolimnetic oxygenation
Fish species and abundance, fish propagation	Use attainability, success of fishery management plan	Gill netting (possible electroshocking), angler surveys, nest counts, larval sampling



LEGEND

- EXISTING FACILITIES
- PROPOSED NEW FACILITIES
- MODIFICATIONS TO EXISTING FACILITIES

① – NITRIFICATION SETTLING TANKS
② – CHLORINE CONTACT TANKS
③ – DECHLORINATION/POST AERATION TANKS

Stearns&Wheler
ENVIRONMENTAL ENGINEERS & SCIENTISTS

DATE: 1/11/96 JOB No.: 2298

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 5-1
FULL-SCALE PLANT UPGRADE
METRO PLANT UPGRADE

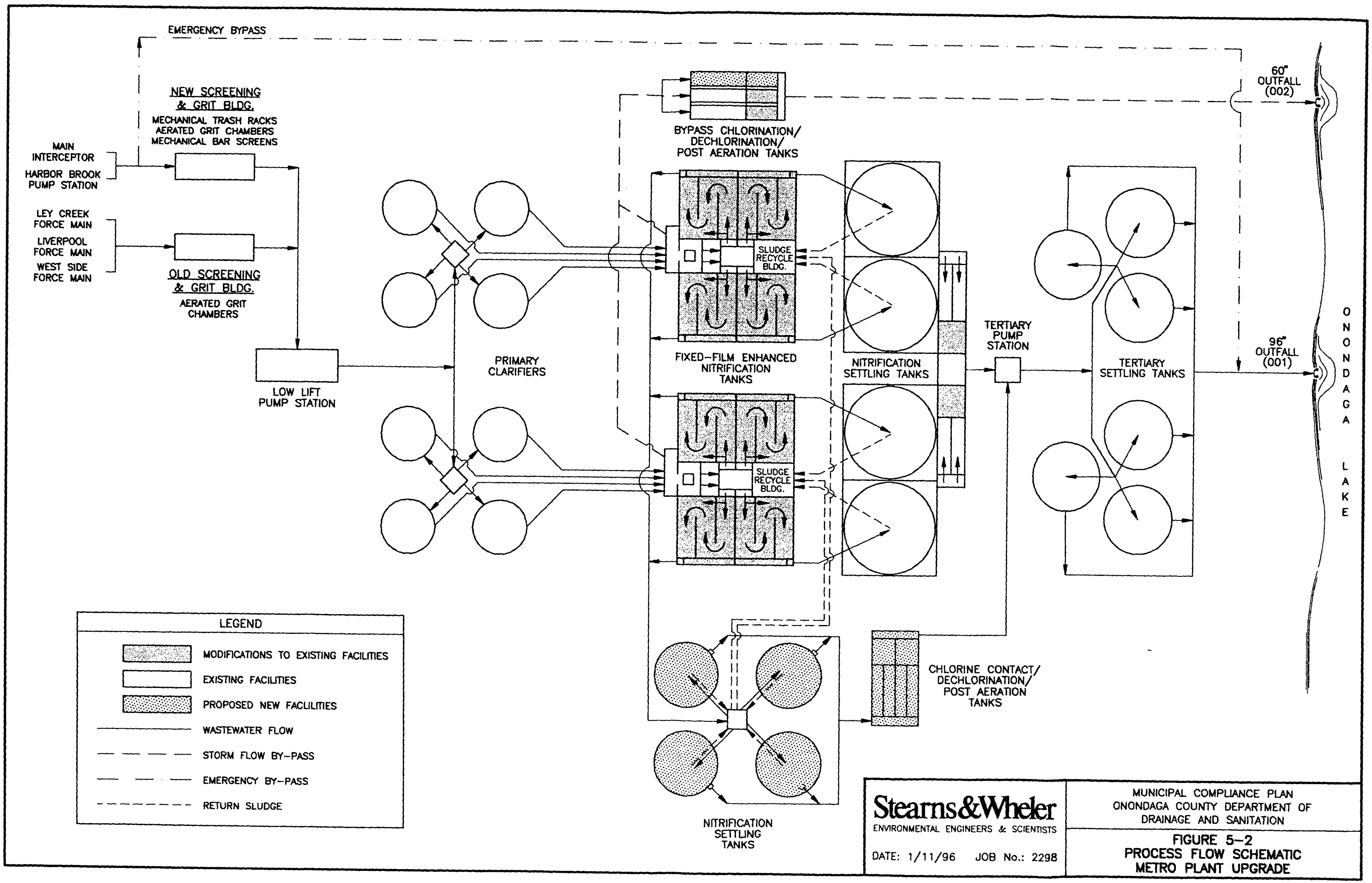
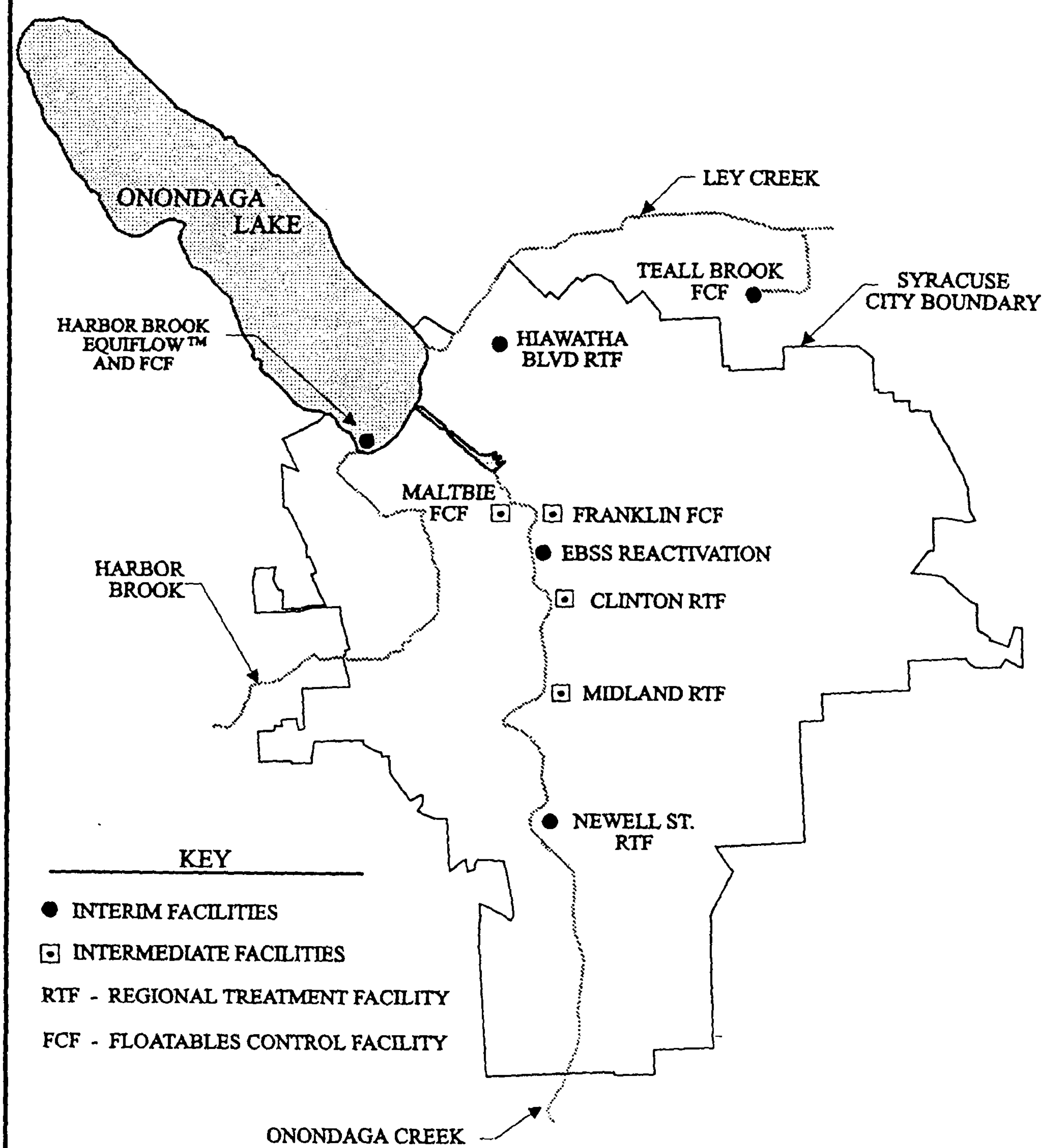


FIGURE 5-2
PROCESS FLOW SCHEMATIC
METRO PLANT UPGRADE



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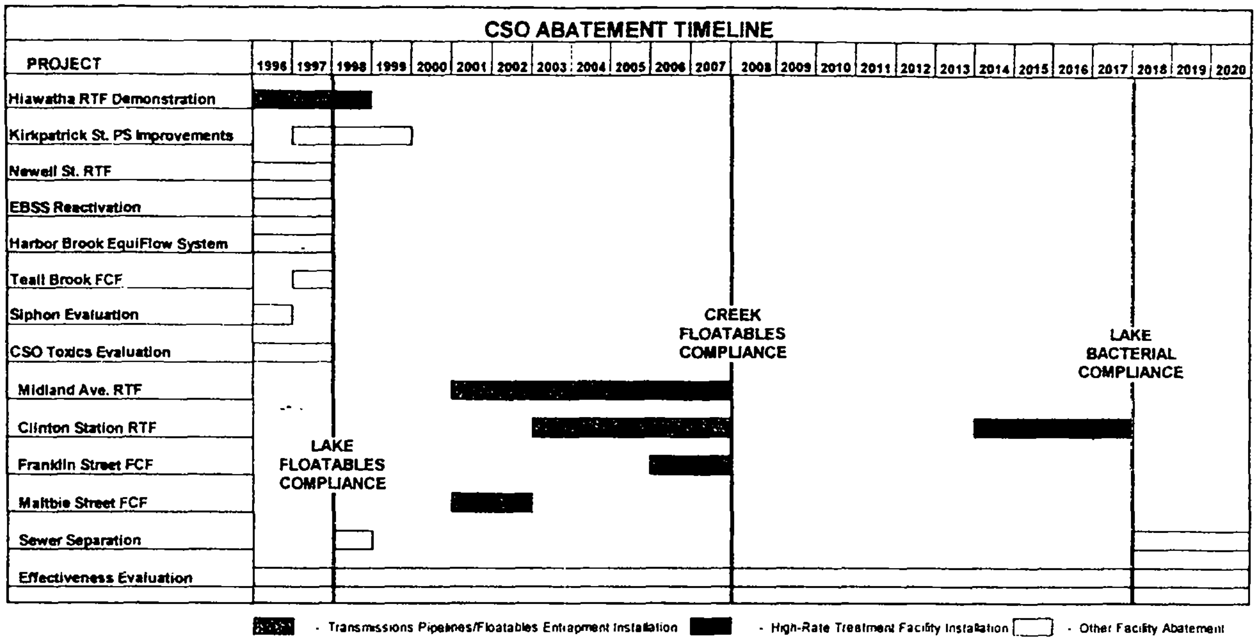
CONSULTING ENGINEERS

DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 5 - 3
INTERIM AND INTERMEDIATE
CSO FACILITIES



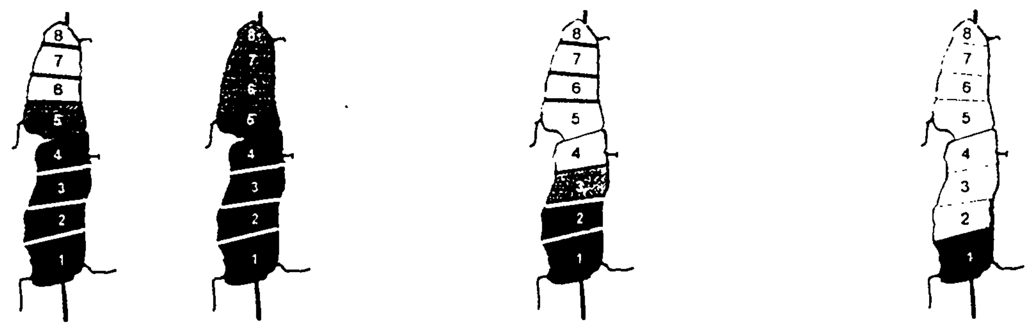
ONONDAGA LAKE BACTERIAL COMPLIANCE PROJECTIONS

Annual Cell Violations in Lake

	1996	2000	2008	2018
Cell 1	21	21	11	7
Cell 2	13	11	7	0
Cell 3	12	11	6	0
Cell 4	8	7	2	0
Cell 5	5	3	0	0
Cell 6	2	1	0	0
Cell 7	1	1	0	0
Cell 8	1	1	0	0

- Unrestricted Water Contact
- Event-Based Water Contact Advisories
- Federal (Presumptive) CSO Policy

Onondaga Lake Bacteria Model Cells



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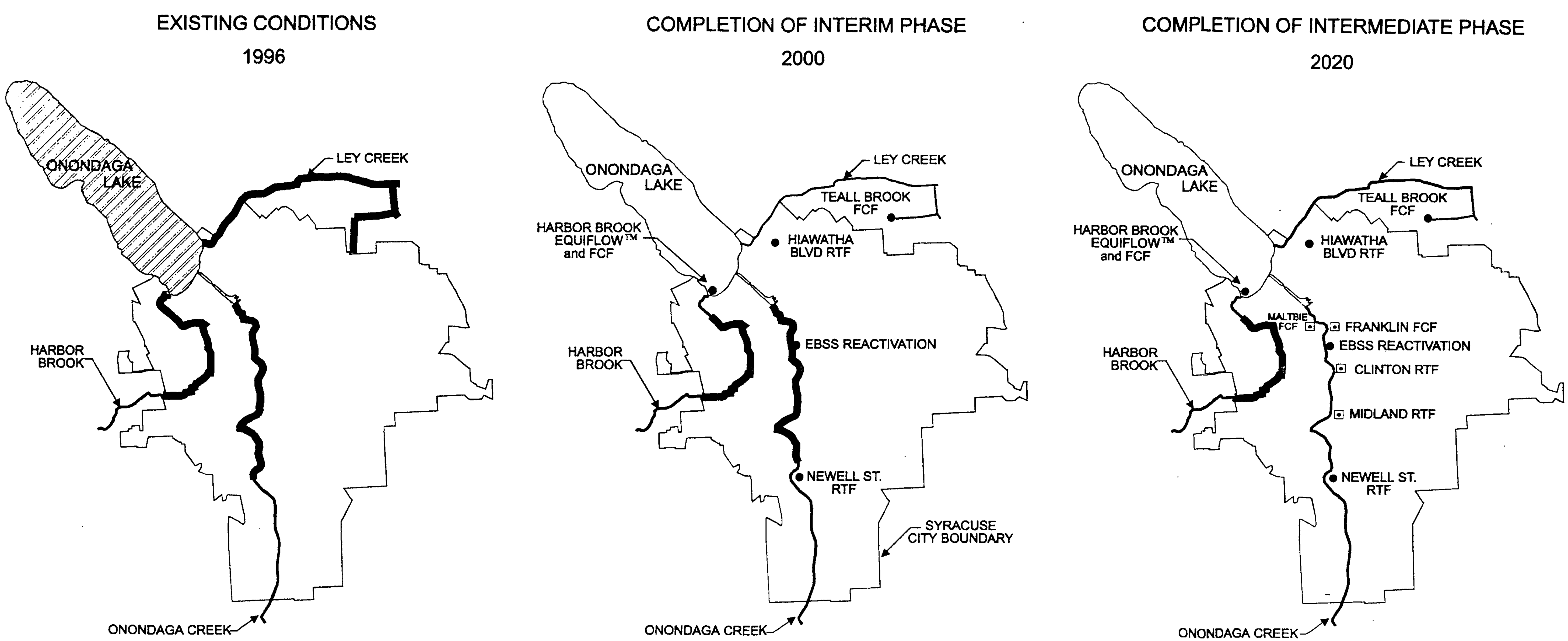
DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5-4
INTERIM AND INTERMEDIATE PHASE BACTERIAL COMPLIANCE TIMELINE

CSO FLOATABLES ABATEMENT



KEY

- ● INTERIM FACILITIES
- ⊡ INTERMEDIATE FACILITIES
- RTF - REGIONAL TREATMENT FACILITY
- FCF - FLOATABLES CONTROL FACILITY
- ▬ CSO FLOATABLES IMPACTED WATERS

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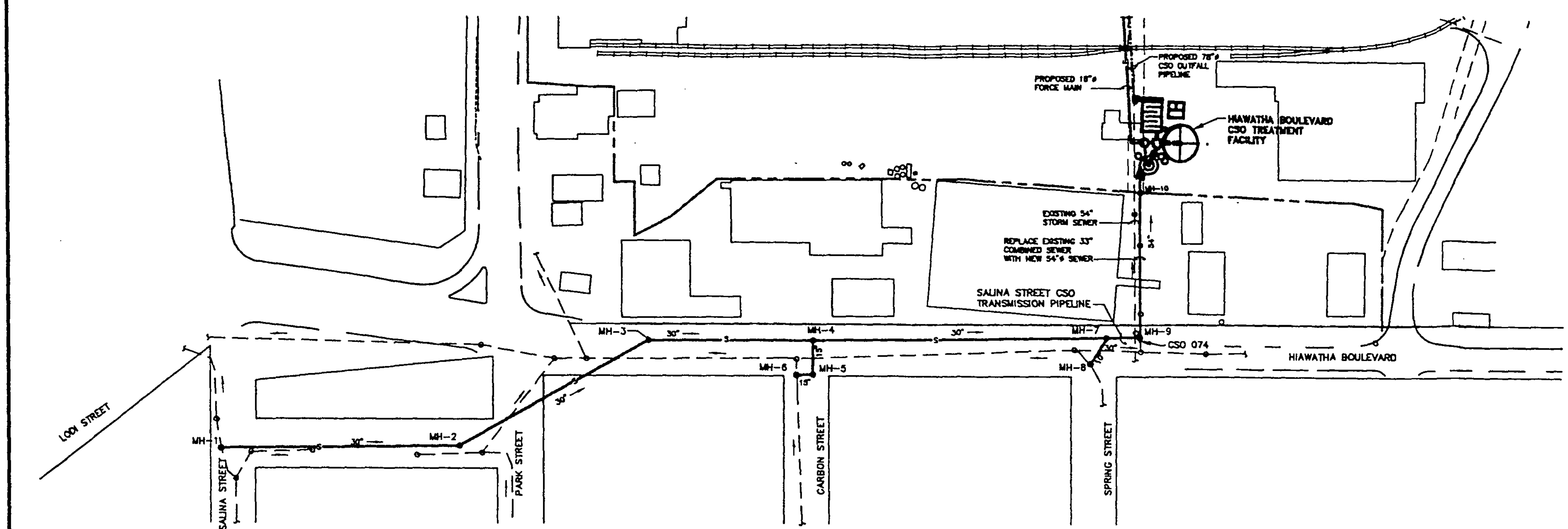
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 5 - 5
CSO FLOATABLES ABATEMENT



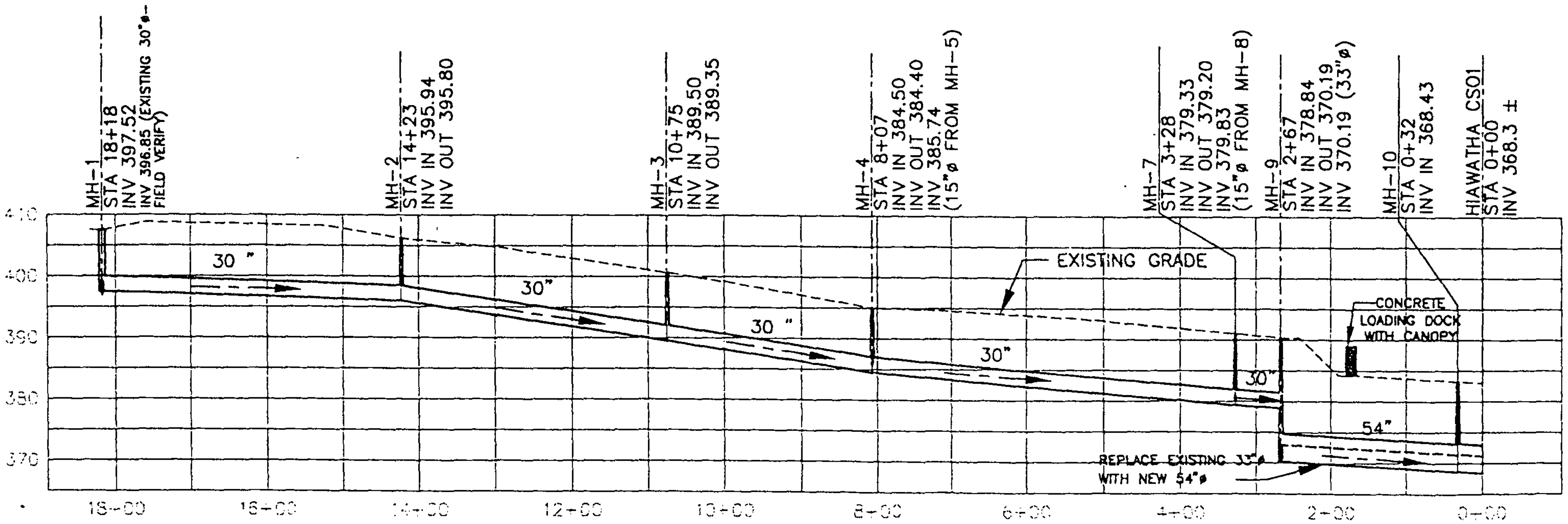
LEGEND

▭	PROPOSED STRUCTURE
— F —	PROPOSED FORCE MAIN
— S —	PROPOSED SEWER
— - S - —	EXISTING SEWER
●	PROPOSED MANHOLE
○	EXISTING MANHOLE
═ ··· ═	CREEK

NOTES:

1. BASE MAP AND UTILITY INFORMATION TAKEN FROM SYRACUSE MARKET CENTER, INC., EXISTING SURVEY, BY O'BRIEN & GERE ENGINEERS, INC., DATED JULY 22, 1993
2. EXISTING SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM CITY OF SYRACUSE SEWER PLANS.
3. PROPOSED SEWER LOCATIONS ARE TAKEN FROM FIGURE 11-3 OF THE HIAWATHA COMBINED SEWER OVERFLOW REGIONAL TREATMENT FACILITIES PRELIMINARY DESIGN REPORT, BY ENVIRONMENTAL ENGINEERING ASSOCIATES, LLP, DATED DECEMBER 1995. PROFILE FROM "PROFILE – PROPOSED CSO TRANSMISSION FACILITIES", AS PREPARED BY ENVIRONMENTAL ENGINEERING ASSOCIATES, LLP, APRIL 24, 1995.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'



SALINA STREET

SCALE – Horiz: 1" = 200', Vert: 1" = 25'

DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 6
SALINA STREET
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC. engineers & scientists

L: ON = * OFF = REF
P: DJC-P-B.PCP
1/96 34– NES AK NES
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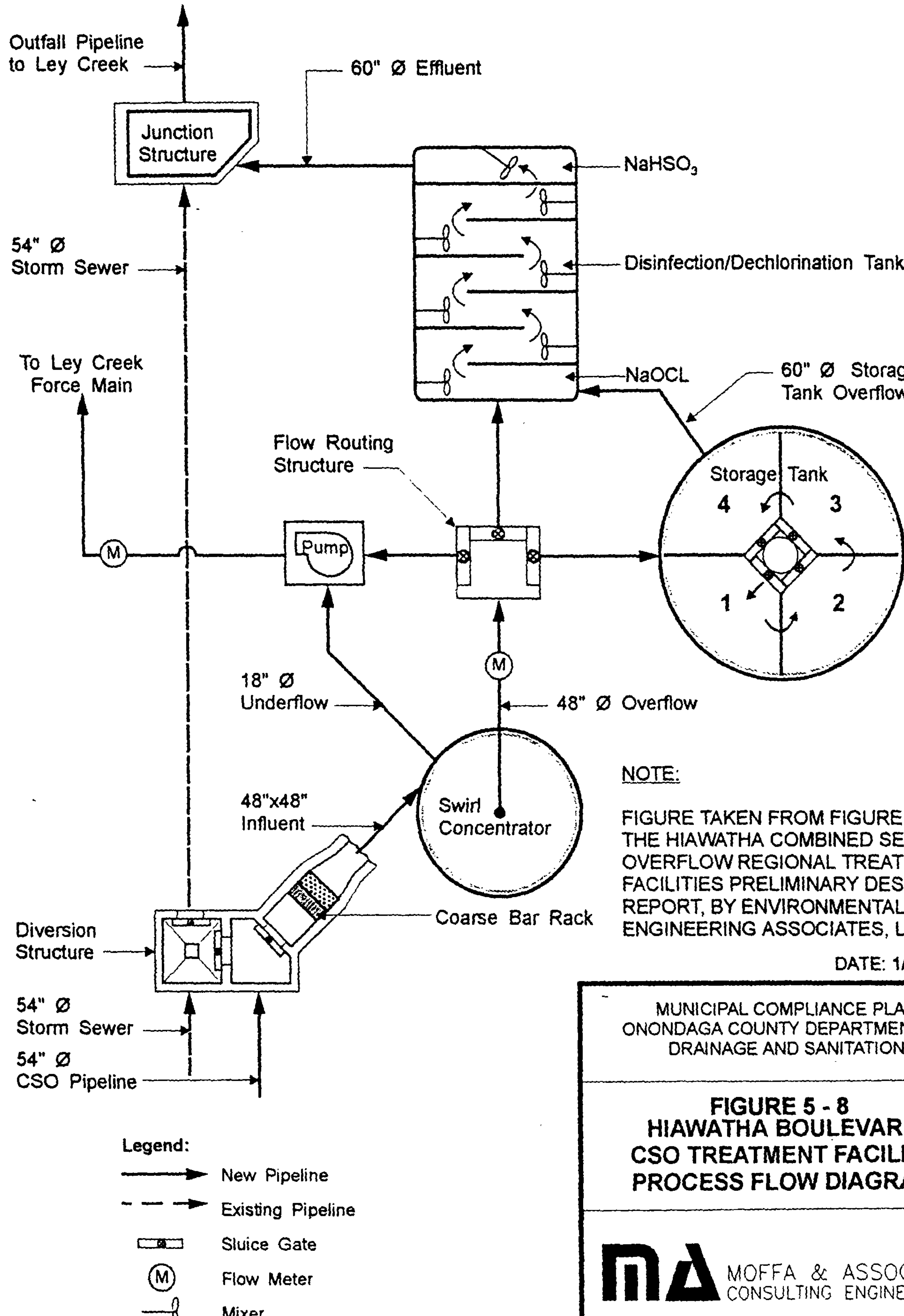

NOTE:

FIGURE TAKEN FROM FIGURE 11-1 OF THE HIAWATHA COMBINED SEWER OVERFLOW REGIONAL TREATMENT FACILITIES PRELIMINARY DESIGN REPORT, BY ENVIRONMENTAL ENGINEERING ASSOCIATES, LLP,

DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 8
HIAWATHA BOULEVARD CSO TREATMENT FACILITY PROCESS FLOW DIAGRAM

MOFFA & ASSOCIA[illegible]
CONSULTING ENGINEER

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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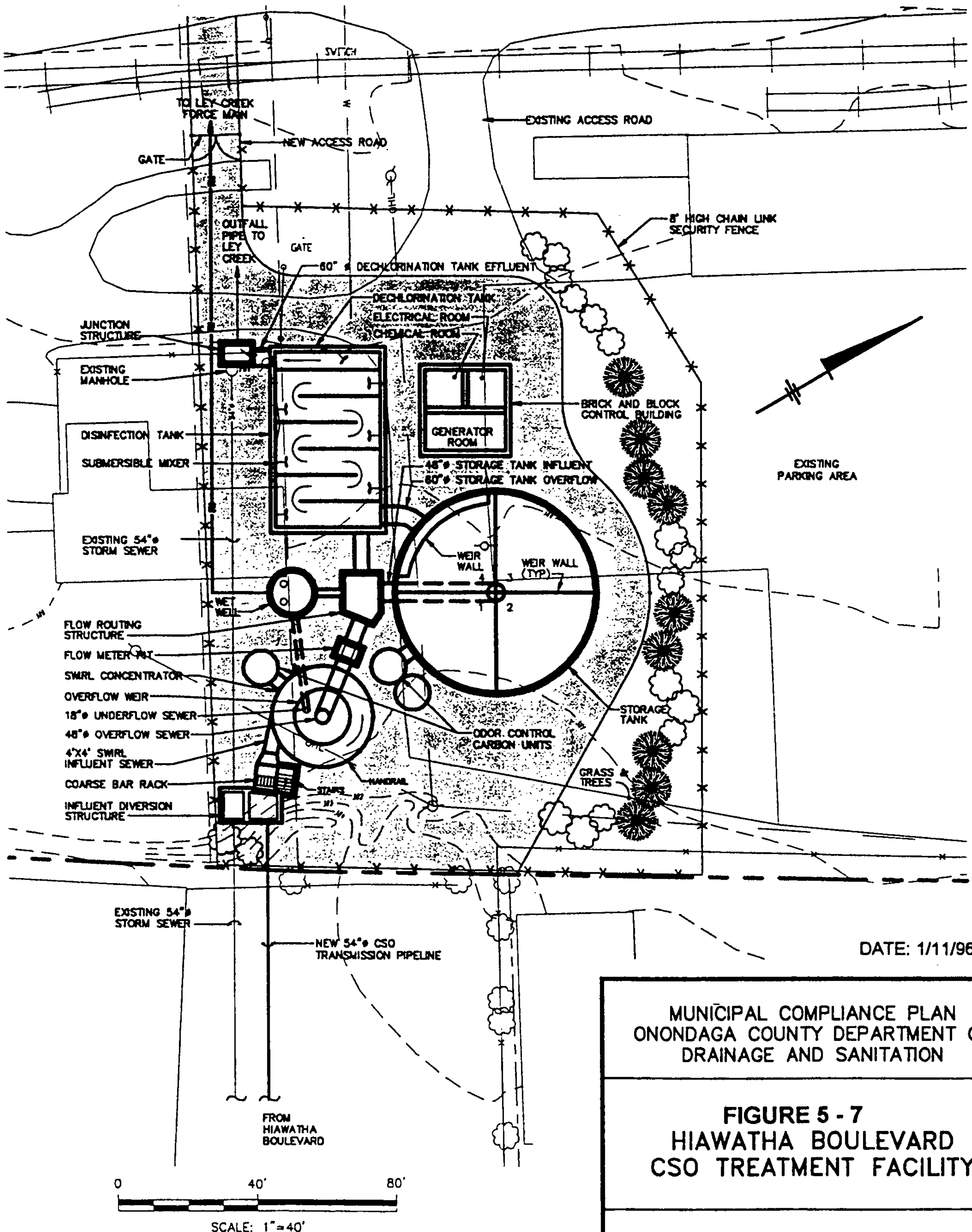


DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

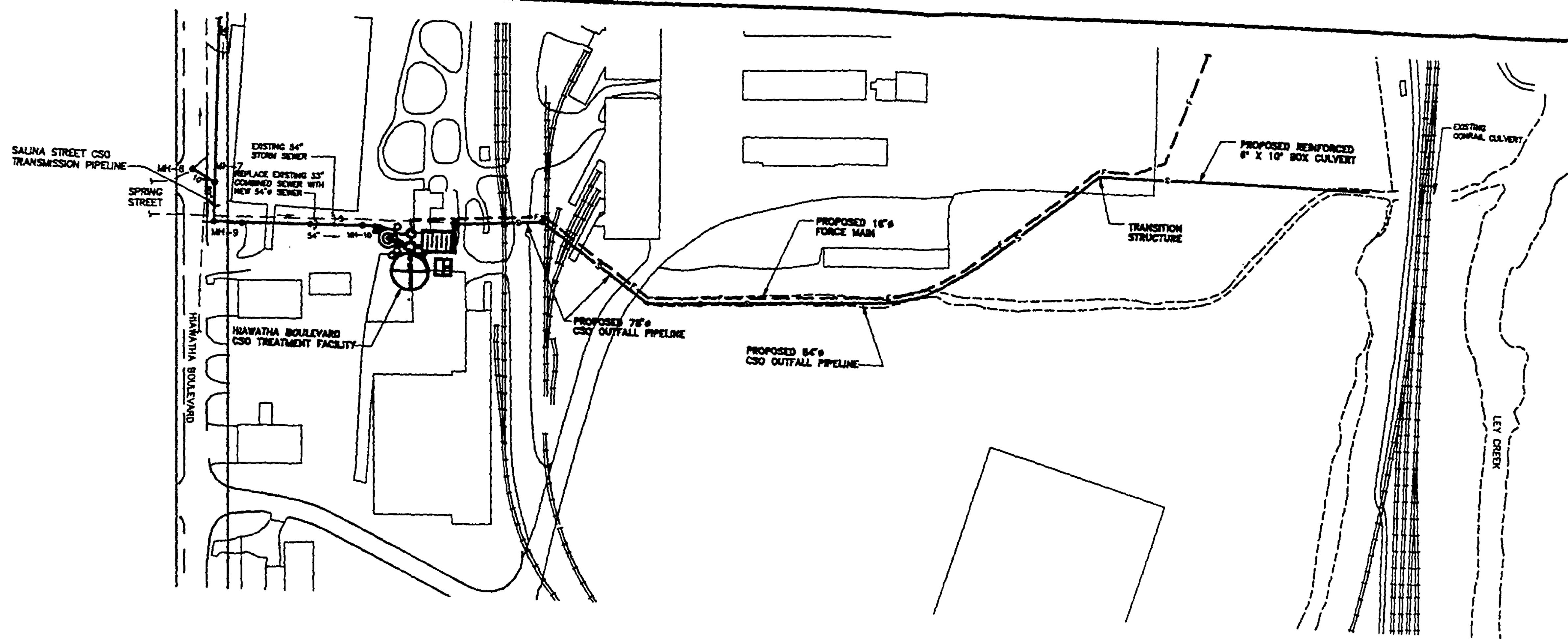
FIGURE 5 - 7
HIAWATHA BOULEVARD
CSO TREATMENT FACILITY

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists

NOTE:
FIGURE TAKEN FROM THE HIAWATHA COMBINED SEWER OVERFLOW REGIONAL TREATMENT FACILITIES PRELIMINARY DESIGN REPORT, BY ENVIRONMENTAL ENGINEERING ASSOCIATES, LLP, DATED DECEMBER, 1995.

L: ON = *; OFF = REF
P: OJC-P-8.PCP
1/96 54-NES
18807036/18807030.DWG



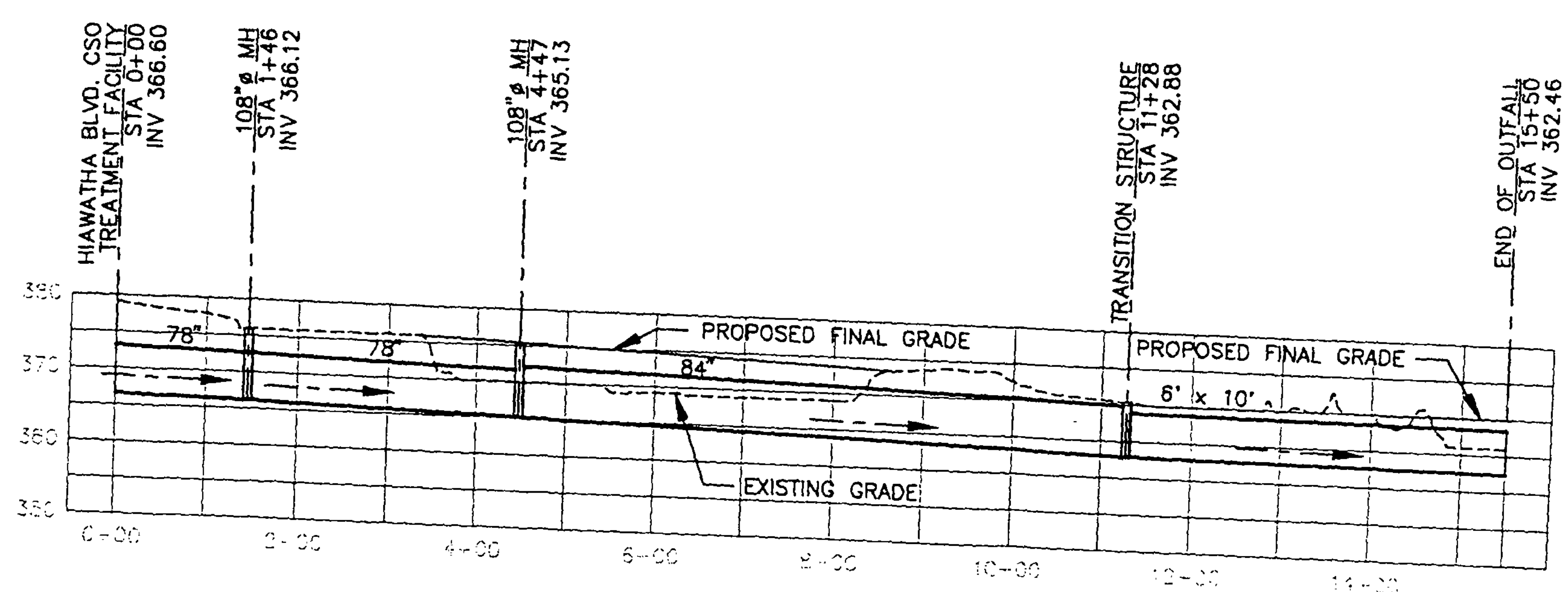
LEGEND

- PROPOSED STRUCTURE
- PROPOSED FORCE MAIN
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- CREEK

NOTES:

1. BASE MAP AND UTILITY INFORMATION TAKEN FROM SYRACUSE MARKET CENTER, INC., EXISTING SURVEY, BY O'BRIEN & GERE ENGINEERS, INC., DATED JULY 22, 1993.
2. EXISTING SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM CITY OF SYRACUSE SEWER PLANS.
3. PROPOSED SEWER LOCATIONS ARE TAKEN FROM FIGURE 11-3 OF THE HIAWATHA COMBINED SEWER OVERFLOW REGIONAL TREATMENT FACILITIES PRELIMINARY DESIGN REPORT, BY ENVIRONMENTAL ENGINEERING ASSOCIATES, LLP, DATED DECEMBER 1995. PROFILE FROM SHEET NOS. 62-65, "HIAWATHA CSO REGIONAL TREATMENT FACILITIES OUTFALL AND FORCE MAIN PLAN AND PROFILE," AS PREPARED BY ENVIRONMENTAL ENGINEERING ASSOCIATES, LLP, APRIL 24, 1995.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'



CSO OUTFALL PIPELINE

SCALE – Horiz: 1" = 200', Vert: 1" = 25'

DATE: 1/11/96

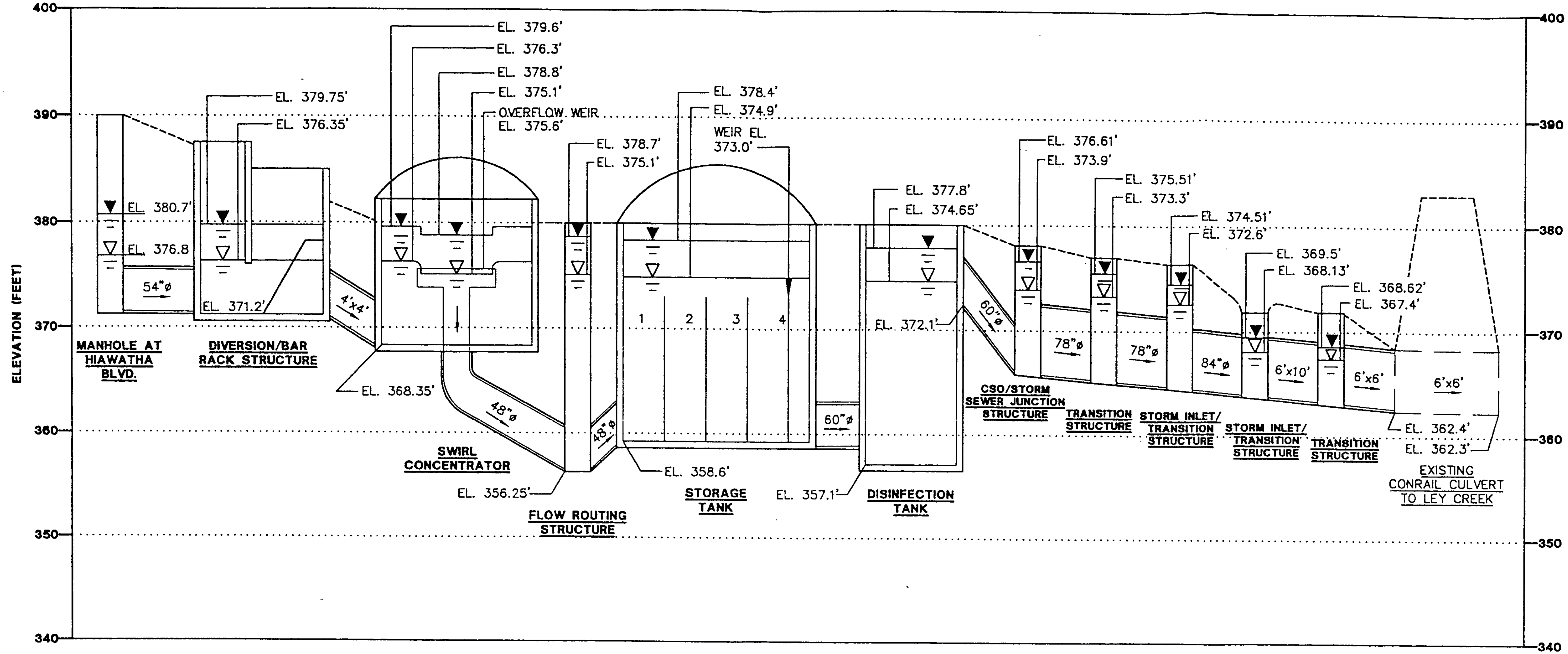
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 9
HIAWATHA BLVD. CSO TREATMENT FACILITY CSO OUTFALL PIPELINE PLAN & PROFILE

MOFFA & ASSOCIATES CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC. engineers & scientists

L: ON=*; OFF=REF
P: OJC-P-B.PCP
1/96 SY– NES AK NES
18807038/18807029.DWG



NOTE:

FIGURE TAKEN FROM FIGURE 11-2 OF THE HIAWATHA COMBINED SEWER OVERFLOW REGIONAL TREATMENT FACILITIES PRELIMINARY DESIGN REPORT, BY ENVIRONMENTAL ENGINEERING ASSOCIATES, LLP, DATED DECEMBER 1995.

10' 0 10' 20'

VERTICAL SCALE: 1"=10'
HORIZONTAL SCALE: NOT TO SCALE

LEGEND

- ▽ 1-YEAR HYDRAULIC GRADELINE
- ▼ 5-YEAR HYDRAULIC GRADELINE
- ------ APPROXIMATE GROUND SURFACE
- 54"ø CONDUIT/CULVERT WITH SIZE

DATE: 1/11/96

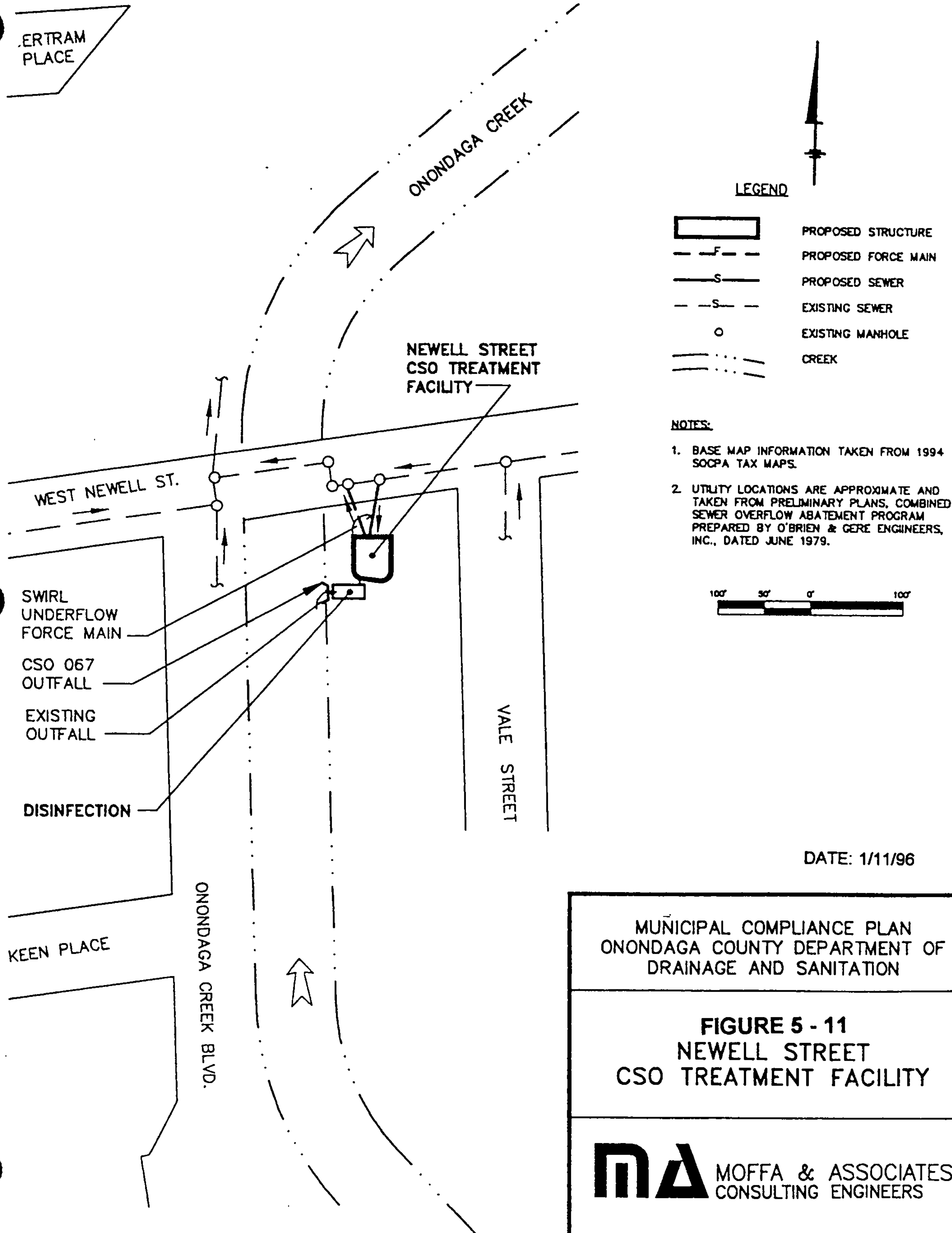
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 10
HIAWATHA BOULEVARD
CSO TREATMENT FACILITY
HYDRAULIC PROFILE

MOFFA & ASSOCIATES CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC. engineers & scientists

OPTIONAL L: OR X:
1/96 54-YOC NES
18807036/18807N01.DWG



DATE: 1/11/96

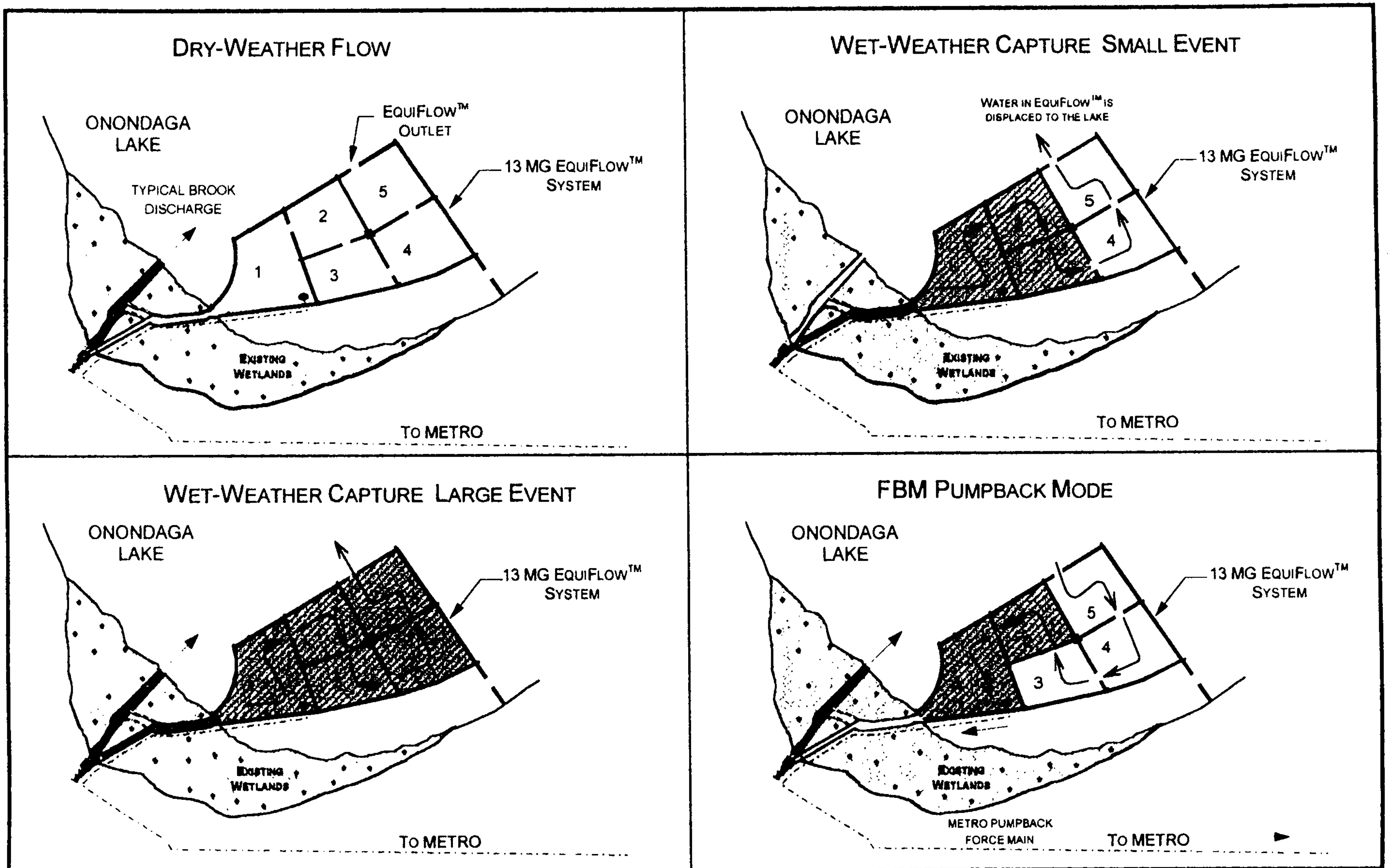
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 11
NEWELL STREET
CSO TREATMENT FACILITY

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

L: ON = *; OFF = REF
P: DJC-P-B.PCP
1/96 54-NES AK NES
18807036/18807G04.DWG

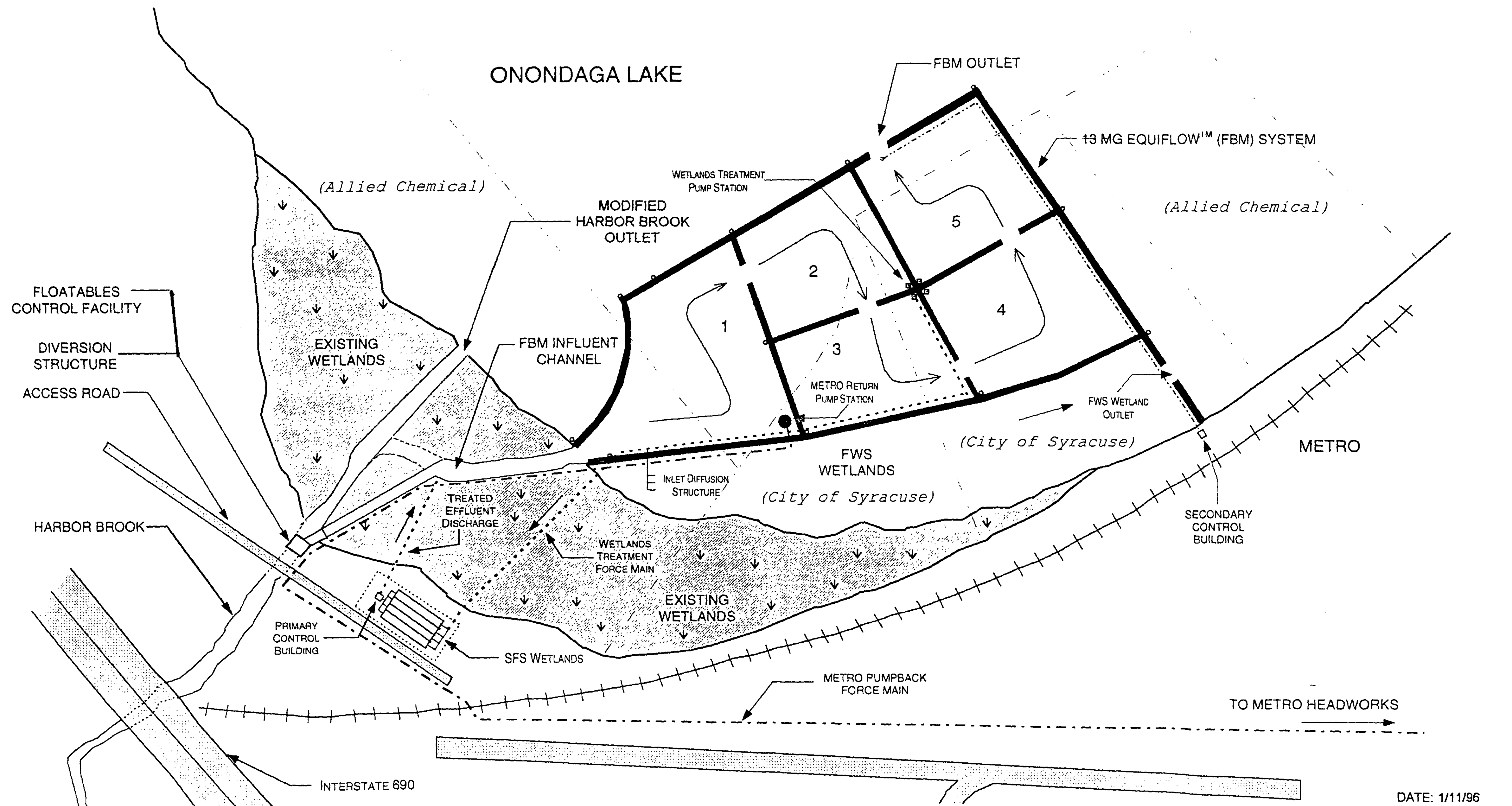


MOFFA & ASSOCIATES
CONSULTING ENGINEERS

DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 5-12
HARBOR BROOK EQUIFLOW™ SYSTEM
OPERATIONAL MODES

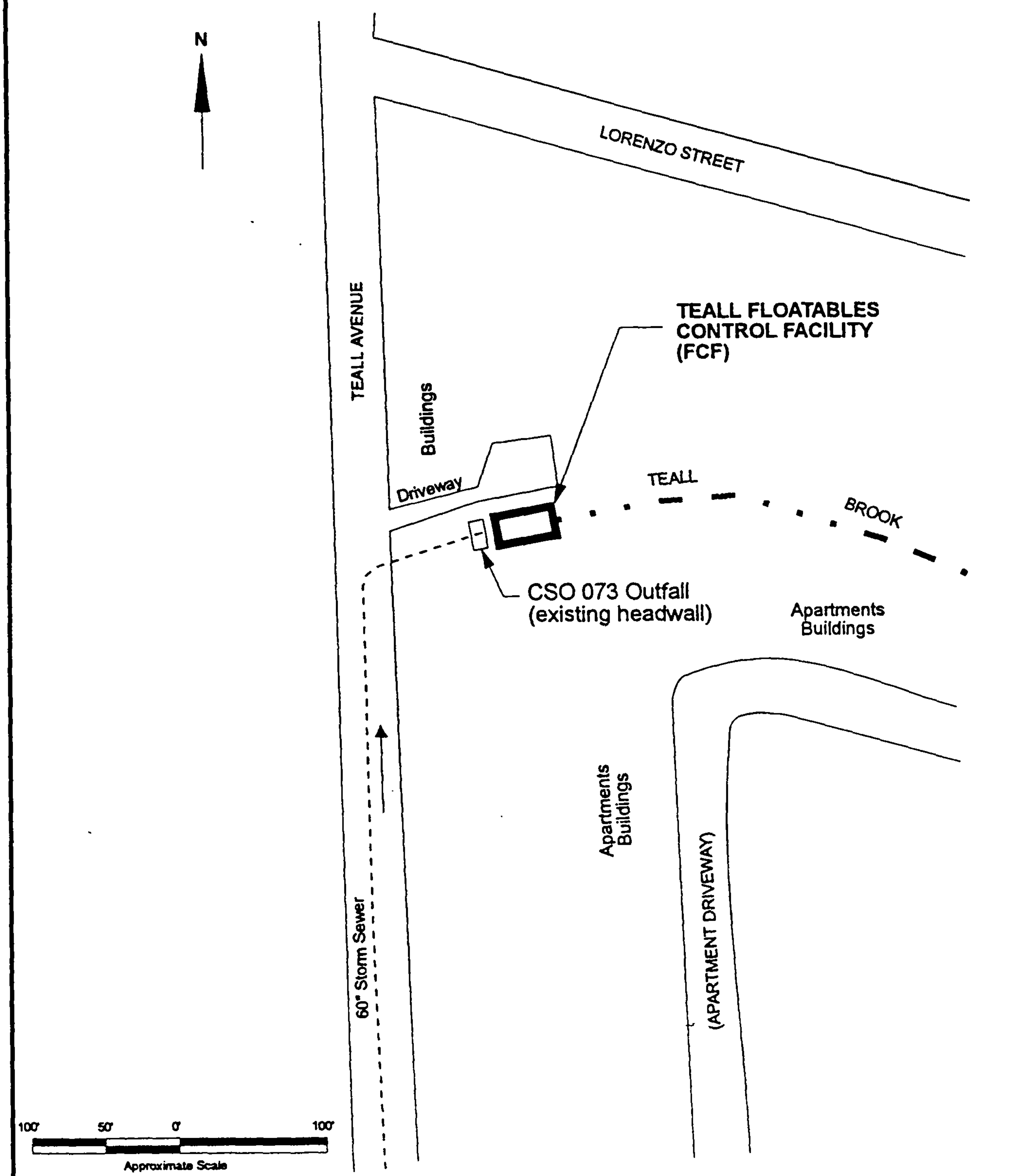


MOFFA & ASSOCIATES CONSULTING ENGINEERS

DATE: 1/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 12
HARBOR BROOK EQUIFLOW™ DEMONSTRATION FACILITIES

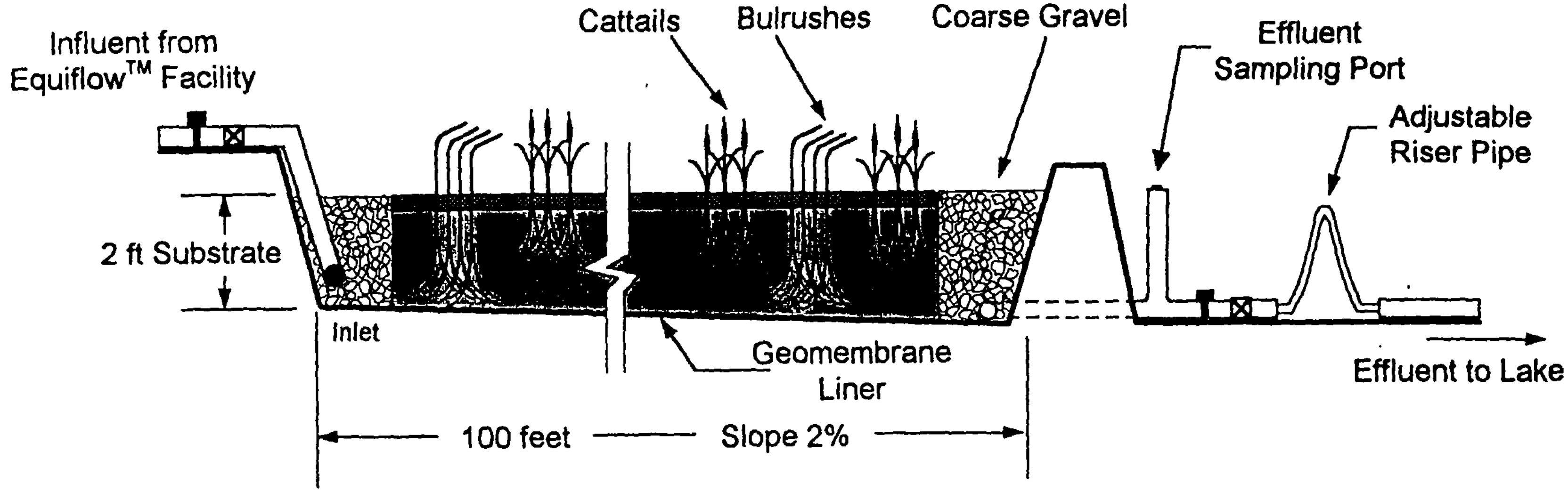


MOFFA & ASSOCIATES
CONSULTING ENGINEERS

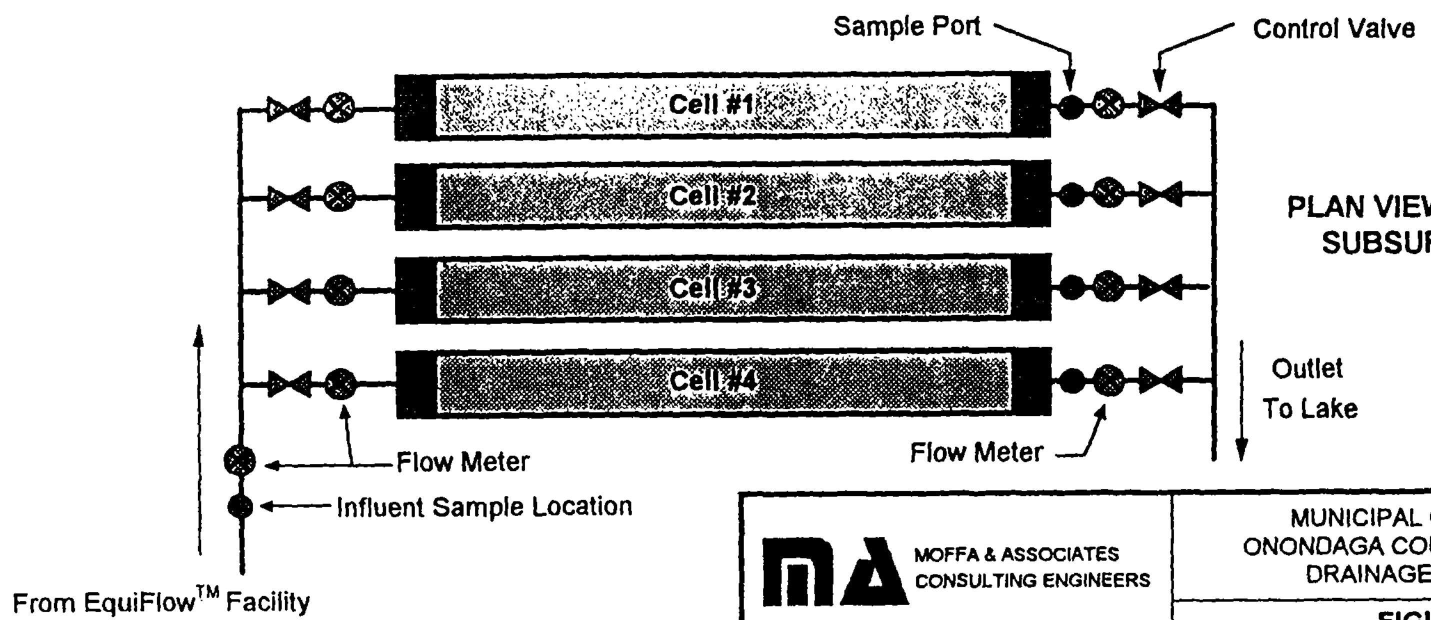
DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 5 - 14
TEALL BROOK FLOATABLES
CONTROL FACILITY



CROSS-SECTION OF CONSTRUCTED SUBSURFACE WETLANDS



PLAN VIEW OF CONSTRUCTED SUBSURFACE WETLANDS

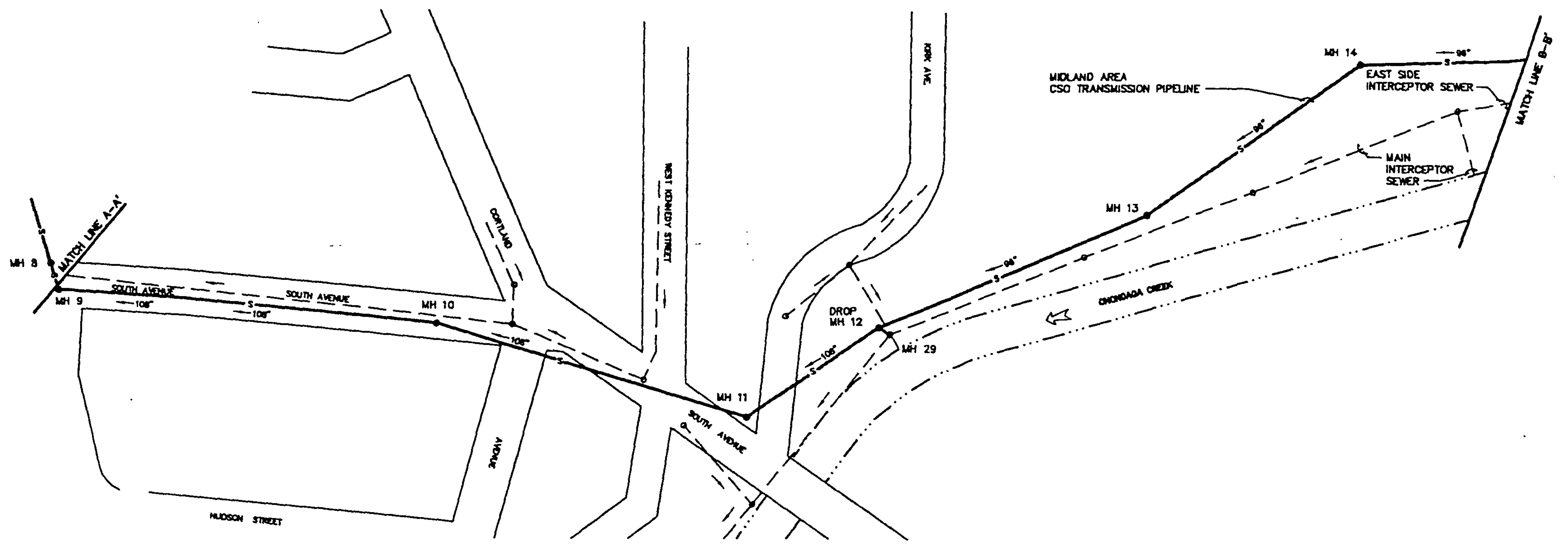
DATE: 1/11/96

MOFFA & ASSOCIATES CONSULTING ENGINEERS

DATE: 1/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5-13
HARBOR BROOK EQUIFLOW™ DEMONSTRATION WETLANDS



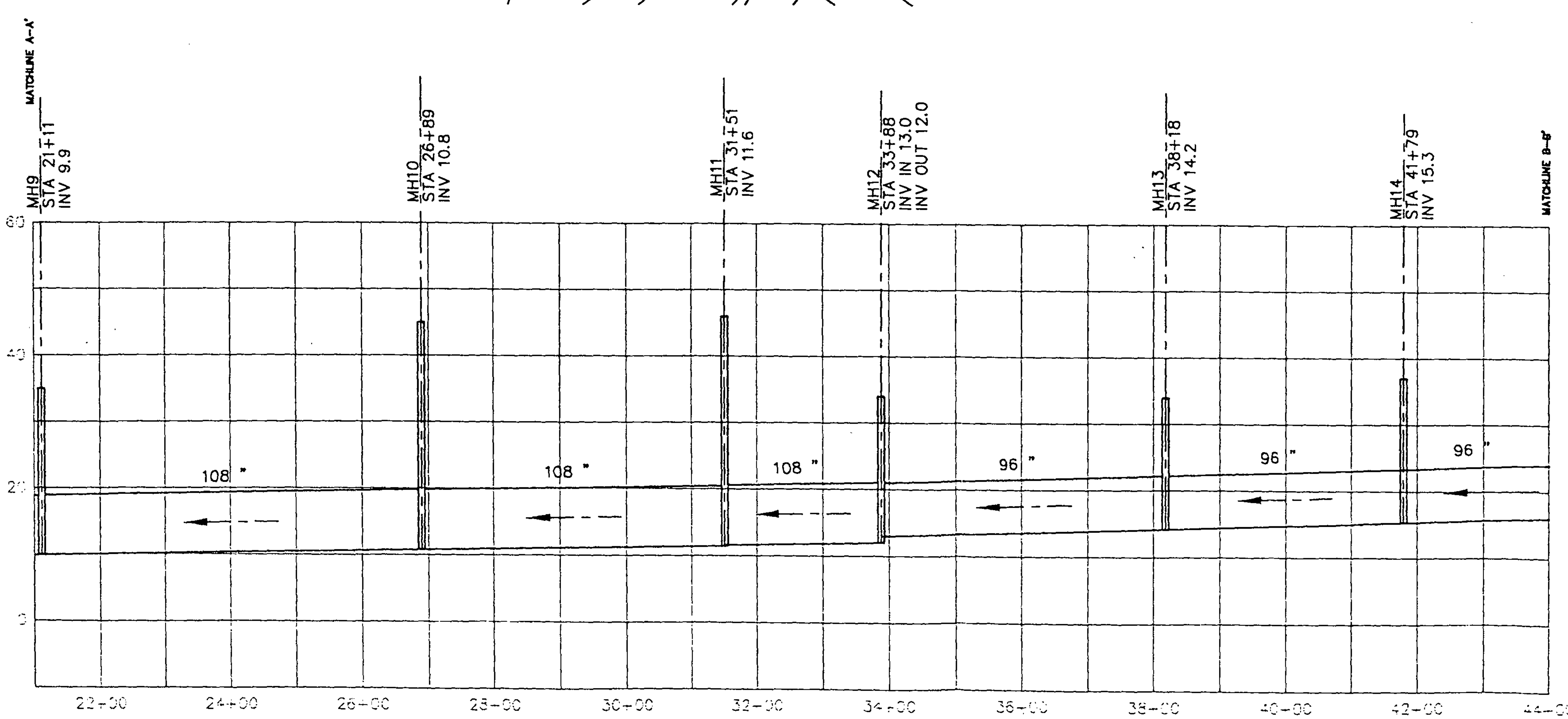
LEGEND

- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- CREEK

NOTES:

1. BASE MAP INFORMATION TAKEN FROM 1994 SOCPA TAX MAPS.
2. EXISTING AND PROPOSED SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM PRELIMINARY PLANS, COMBINED SEWER OVERFLOW ABATEMENT PROGRAM PREPARED BY O'BRIEN & GERE ENGINEERS, INC., DATED JUNE 1979; MODIFIED AS PER COMBINED SEWER OVERFLOW FACILITIES PLAN BY MOFFA & ASSOCIATES AND BLASLAND & BOUCK ENGINEERS, P.C. DATED FEBRUARY 28, 1991, AND FROM CSO TREATMENT FACILITY SITE PLANS, MUNICIPAL COMPLIANCE PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT, DATED APRIL 1994.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'



MIDLAND AREA

SCALE – Horiz: 1" = 200', Vert: 1" = 20'

DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

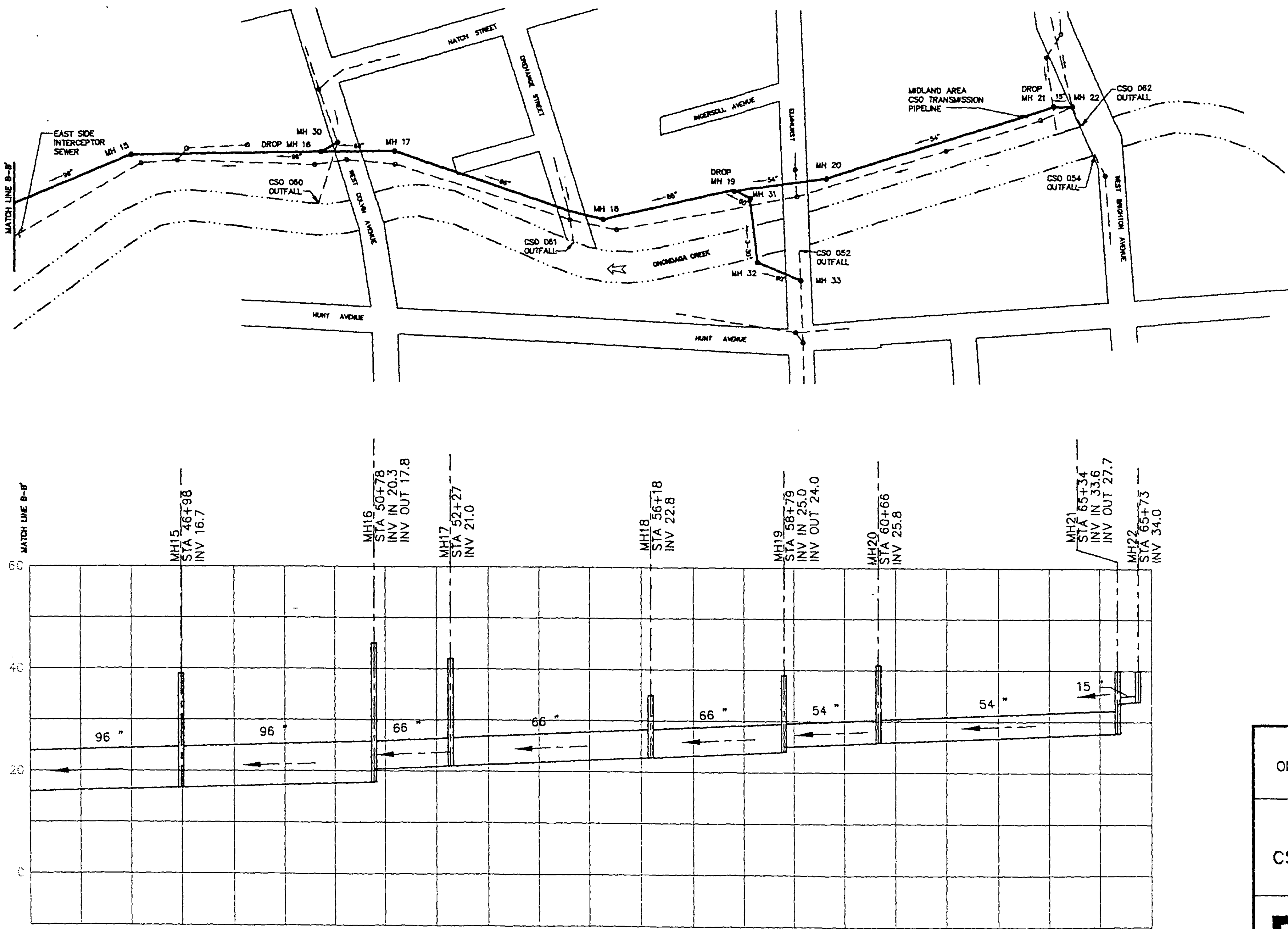
FIGURE 5 - 16

MIDLAND AREA
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

L: ON = *, OFF = REF
P: DJC-P-8.PCP
1/96 54-- NES, RLP NES
18807036/18807G18.DWG



MIDLAND AREA

SCALE – Horiz: 1" = 200', Vert: 1" = 20'

LEGEND

- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- CREEK

NOTES:

1. BASE MAP INFORMATION TAKEN FROM 1994 SOCPA TAX MAPS.
2. EXISTING AND PROPOSED SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM PRELIMINARY PLANS, COMBINED SEWER OVERFLOW ABATEMENT PROGRAM PREPARED BY O'BRIEN & GERE ENGINEERS, INC., DATED JUNE 1979; MODIFIED AS PER COMBINED SEWER OVERFLOW FACILITIES PLAN BY MOFFA & ASSOCIATES AND BLASLAND & BOUCK ENGINEERS, P.C. DATED FEBRUARY 28, 1991, AND FROM CSO TREATMENT FACILITY SITE PLANS, MUNICIPAL COMPLIANCE PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT, DATED APRIL 1994.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'

DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 17
MIDLAND AREA
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

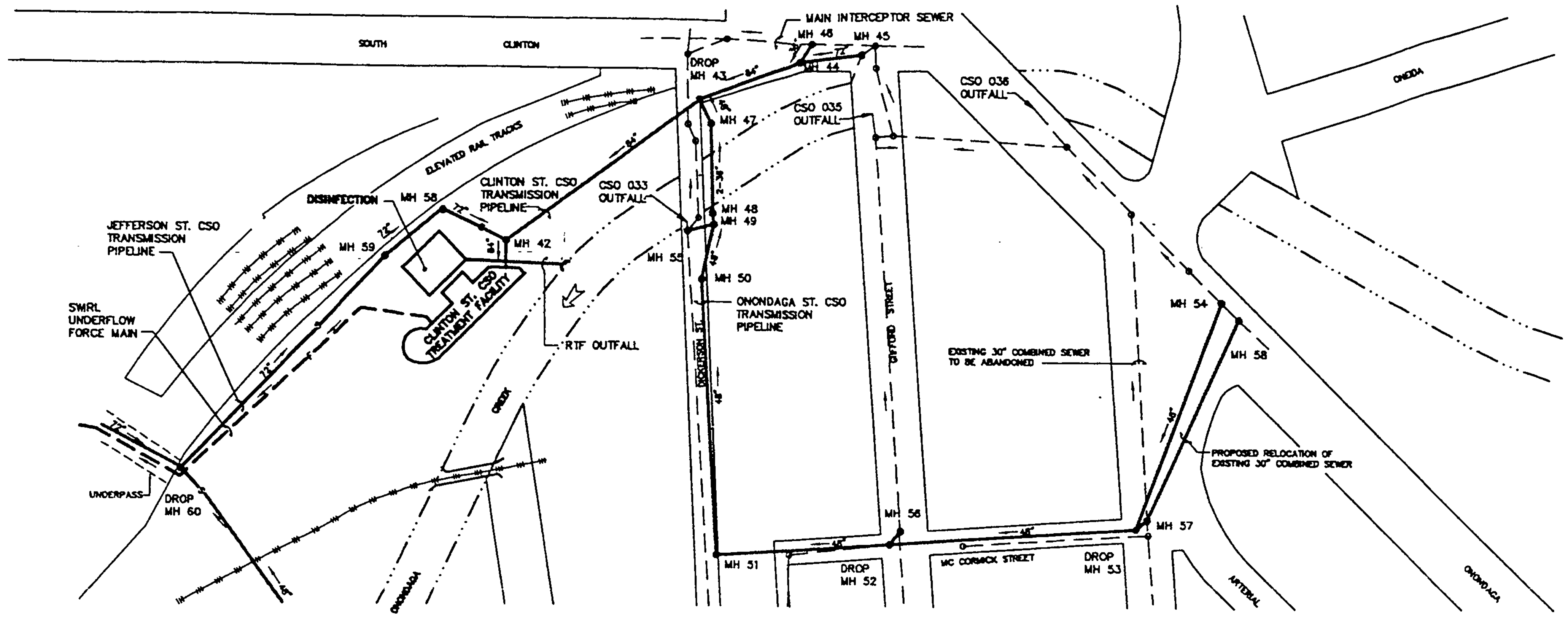
L: ON = *; OFF = REF
P: DJC-P-B.PCP
1/96 54- MES RLP MES
18807036/18807G19.DWG

c. State Revolving Loan Fund (SRF) assistance, whereby the County could borrow significant portions of the MCP cost through the SRF. The SRF provides no interest loans. Small communities experiencing hardship are the typical recipients of these loans. However, the EFC has the ability to modify the guidelines used to administer these loans. Use of no interest loans could dramatically reduce the cost to the Onondaga County Sanitary District ratepayers. The SRF also provides subsidized financing through reducing the interest cost to a rate approximately equal to two-thirds of the market rate. Use of this mechanism would marginally reduce the user fees.

Given the present budgetary upheaval at the federal level, it is difficult to project what types of federal assistance may be available for projects such as the MCP. This also carries over to the SRF. The amounts potentially available for funding depend upon reauthorization of the Clean Water Act and the amount eventually appropriated to provide additional loan amounts. Under the most optimistic circumstances, given full reauthorization and limited demand for funding within New York State, the County is unlikely to be able to finance more than 50 percent of its project costs through the SRF. A more likely case is SRF funding will be limited to approximately 10 to 20 percent of financing requirements. State grants are also viewed as unlikely at this time. However, they remain a key ingredient in the County's ability to implement the MCP without causing significant financial and economic damage.

6.3 APPROVALS NEEDED

Upon completion of the SEQR process and the issuance of permits, Onondaga County will commence implementation of the interim and intermediate METRO and CSO improvements which comprise the Municipal Compliance Plan. It will be necessary to obtain site-specific project construction-related approvals for funding, environmental impact, and mitigation and work within street and highway rights-of-way. It will be necessary to complete site-specific supplemental EIS documents prior to implementation of intermediate CSO projects. Figure 6-7 summarizes permits and approvals which will be needed in connection with project implementation.



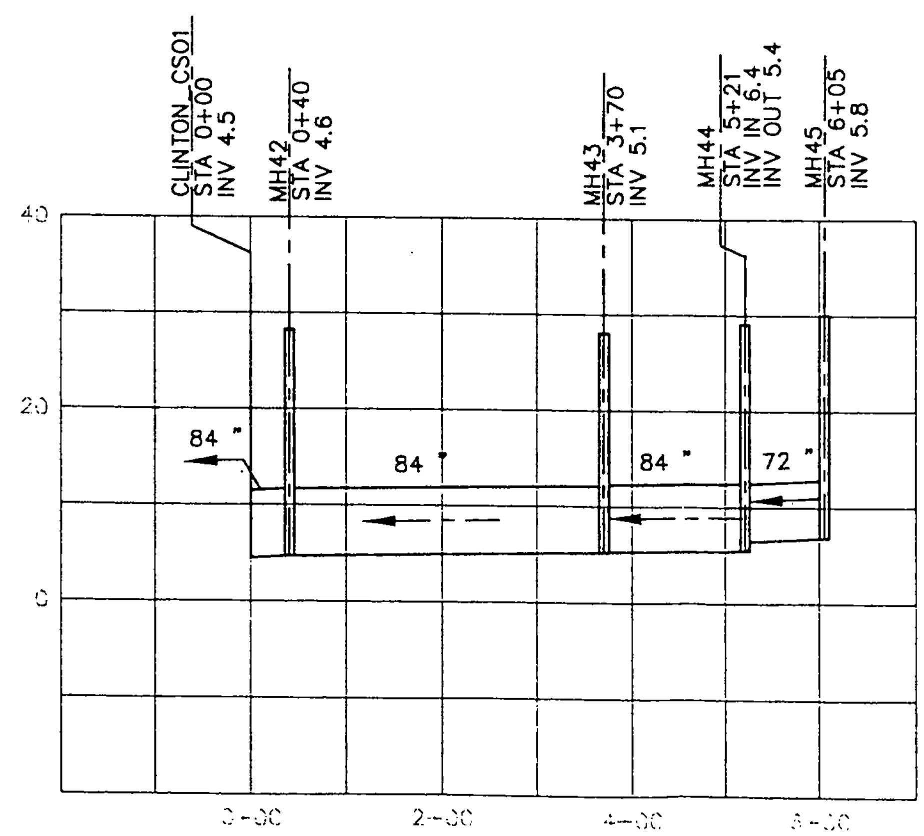
LEGEND

- PROPOSED STRUCTURE
- PROPOSED FORCE MAIN
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- CREEK

NOTES:

1. "BASE MAP INFORMATION TAKEN FROM 1994 SOCPA TAX MAPS.
2. EXISTING AND PROPOSED SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM PRELIMINARY PLANS, COMBINED SEWER OVERFLOW ABATEMENT PROGRAM PREPARED BY O'BRIEN & GERE ENGINEERS, INC., DATED JUNE 1979; MODIFIED AS PER COMBINED SEWER OVERFLOW FACILITIES PLAN BY MOFFA & ASSOCIATES AND BLASLAND & BOUCK ENGINEERS, P.C. DATED FEBRUARY 28, 1991, AND FROM CSO TREATMENT FACILITY SITE PLANS, MUNICIPAL COMPLIANCE PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT, DATED APRIL 1994.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'



CLINTON STREET

SCALE – Horiz: 1" = 200', Vert: 1" = 20'

DATE: 1/11/96

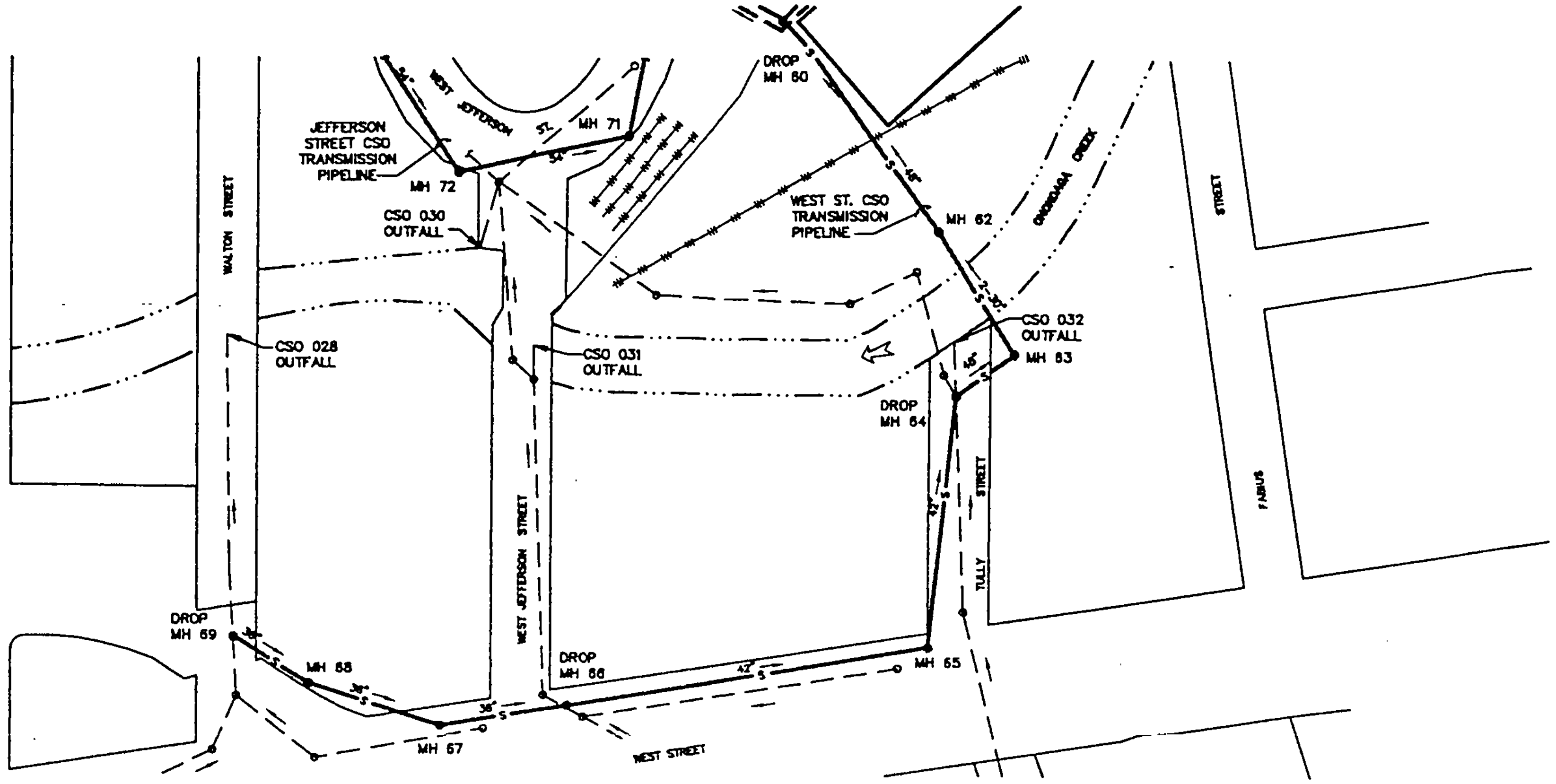
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

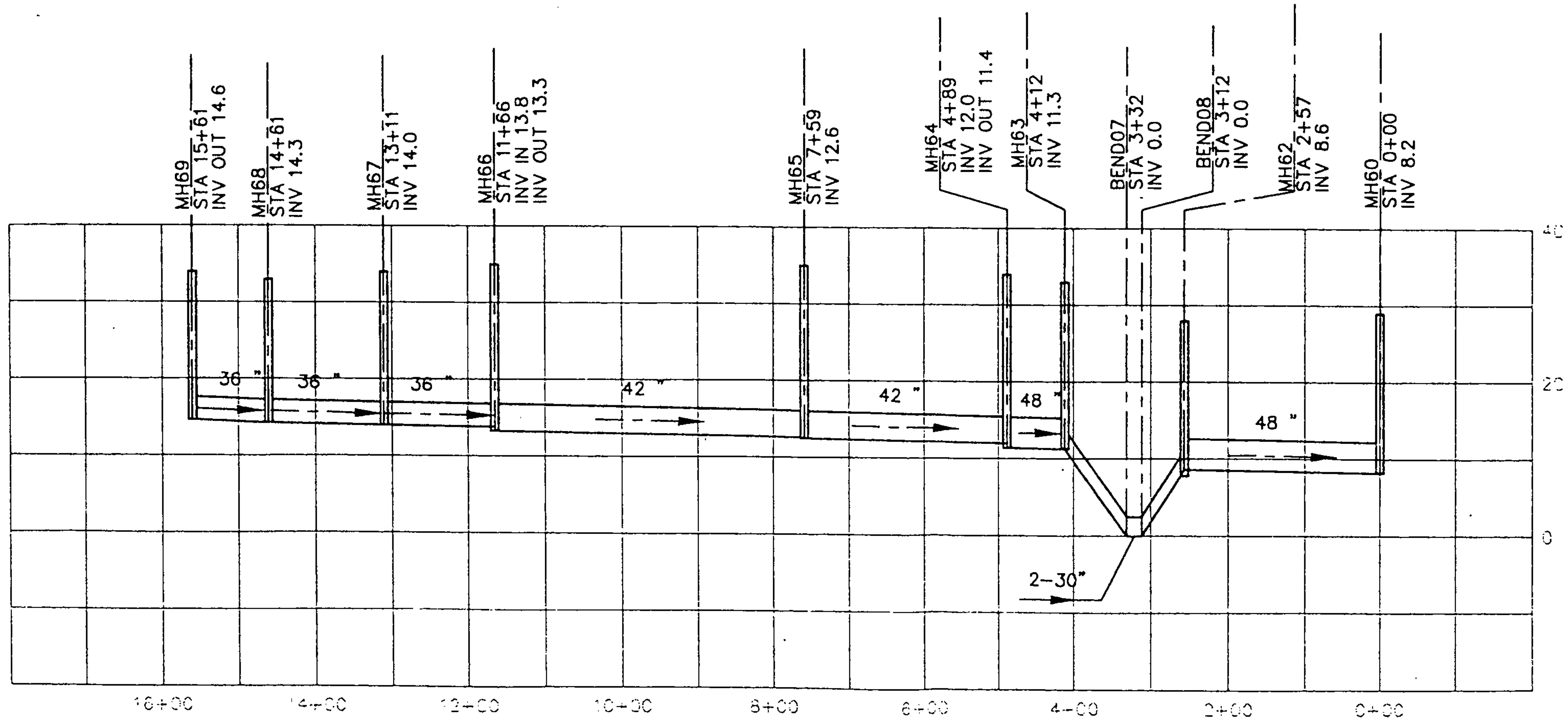
FIGURE 5 - 19
CLINTON STREET
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

L: ON = *; OFF = REF
P: DJC-P-8.PCP
1/96 54– NES RLP NES
18807036/18807G24.DWG





WEST STREET

SCALE – Horiz: 1" = 200', Vert: 1" = 20'

LEGEND

- PROPOSED STRUCTURE
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- CREEK

NOTES:

1. BASE MAP INFORMATION TAKEN FROM 1994 SOCPA TAX MAPS.
2. EXISTING AND PROPOSED SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM PRELIMINARY PLANS, COMBINED SEWER OVERFLOW ABATEMENT PROGRAM PREPARED BY O'BRIEN & GERE ENGINEERS, INC., DATED JUNE 1979; MODIFIED AS PER COMBINED SEWER OVERFLOW FACILITIES PLAN BY MOFFA & ASSOCIATES AND BLASLAND & BOUCK ENGINEERS, P.C. DATED FEBRUARY 28, 1991, AND FROM CSO TREATMENT FACILITY SITE PLANS, MUNICIPAL COMPLIANCE PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT, DATED APRIL 1994.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'

DATE: 1/11/96

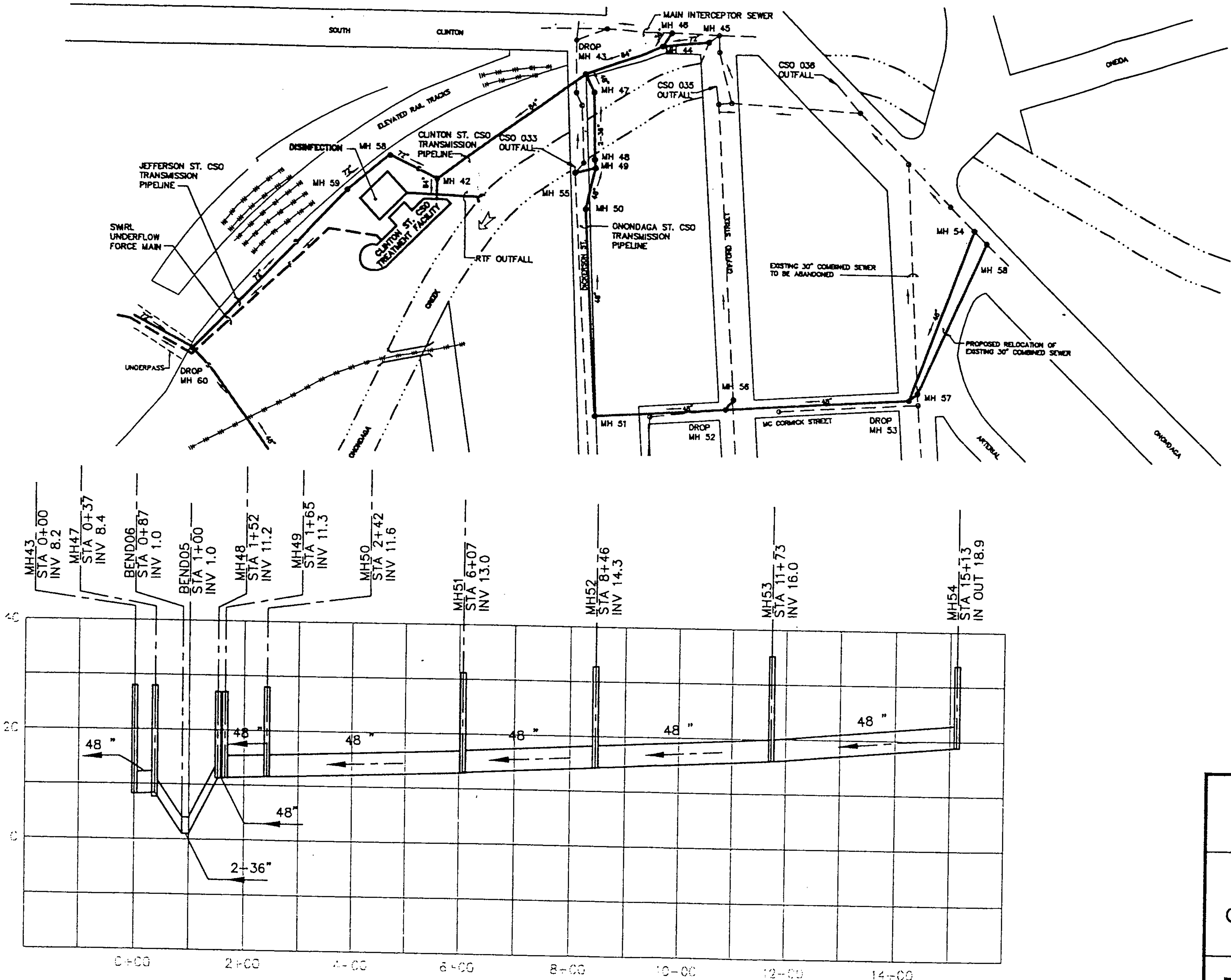
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 20
WEST STREET
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC. engineers & scientists

L: ON = *; OFF = REF
P: DJC-P-BLPCP
1/96 54- NES RLP NES
18807036/18807G20.DWG



ONONDAGA STREET

SCALE – Horiz: 1" = 200', Vert: 1" = 20'

LEGEND

▭	PROPOSED STRUCTURE
— F —	PROPOSED FORCE MAIN
—S—	PROPOSED SEWER
– S –	EXISTING SEWER
●	PROPOSED MANHOLE
○	EXISTING MANHOLE
— · · —	CREEK

NOTES:

1. BASE MAP INFORMATION TAKEN FROM 1994 SOCPA TAX MAPS.
2. EXISTING AND PROPOSED SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM PRELIMINARY PLANS, COMBINED SEWER OVERFLOW ABATEMENT PROGRAM PREPARED BY O'BRIEN & GERE ENGINEERS, INC., DATED JUNE 1979; MODIFIED AS PER COMBINED SEWER OVERFLOW FACILITIES PLAN BY MOFFA & ASSOCIATES AND BLASLAND & BOUCK ENGINEERS, P.C. DATED FEBRUARY 28, 1991, AND FROM CSO TREATMENT FACILITY SITE PLANS, MUNICIPAL COMPLIANCE PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT, DATED APRIL 1994.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'

DATE: 1/11/96

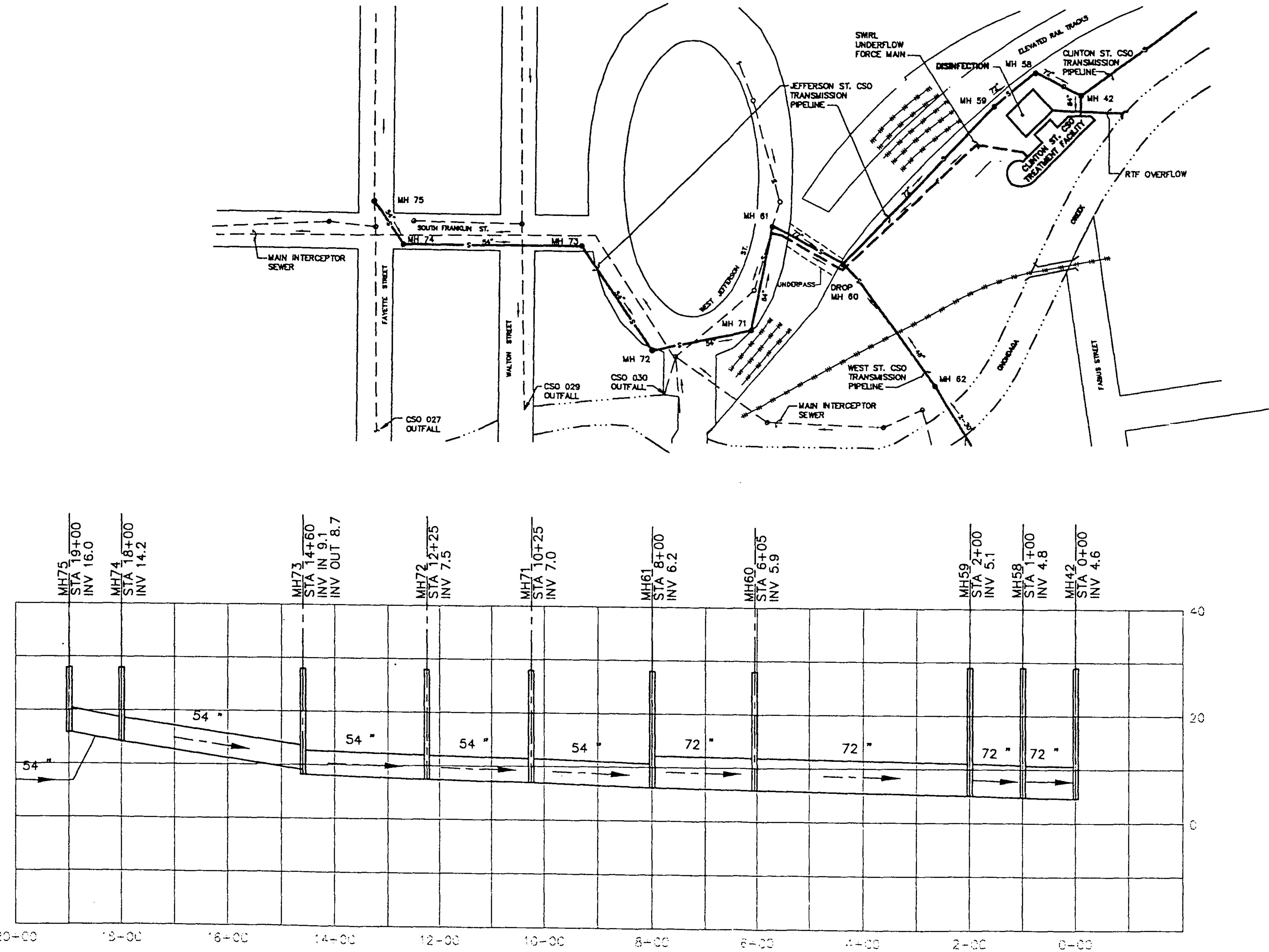
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 21
ONONDAGA STREET
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

L: ON = *; OFF = REF
P: OJC-P-B.PCP
1/96 54- NES RLP NES
18807036/18807G26.DWG



JEFFERSON STREET

SCALE – Horiz: 1" = 200', Vert: 1" = 20'

LEGEND

- PROPOSED STRUCTURE
- PROPOSED FORCE MAIN
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- CREEK

NOTES:

1. BASE MAP INFORMATION TAKEN FROM 1994 SOCPA TAX MAPS.
2. EXISTING AND PROPOSED SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM PRELIMINARY PLANS, COMBINED SEWER OVERFLOW ABATEMENT PROGRAM PREPARED BY O'BRIEN & GERE ENGINEERS, INC., DATED JUNE 1979; MODIFIED AS PER COMBINED SEWER OVERFLOW FACILITIES PLAN BY MOFFA & ASSOCIATES AND BLASLAND & BOUCK ENGINEERS, P.C. DATED FEBRUARY 28, 1991, AND FROM CSO TREATMENT FACILITY SITE PLANS, MUNICIPAL COMPLIANCE PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT, DATED APRIL 1994.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'

DATE: 1/11/96

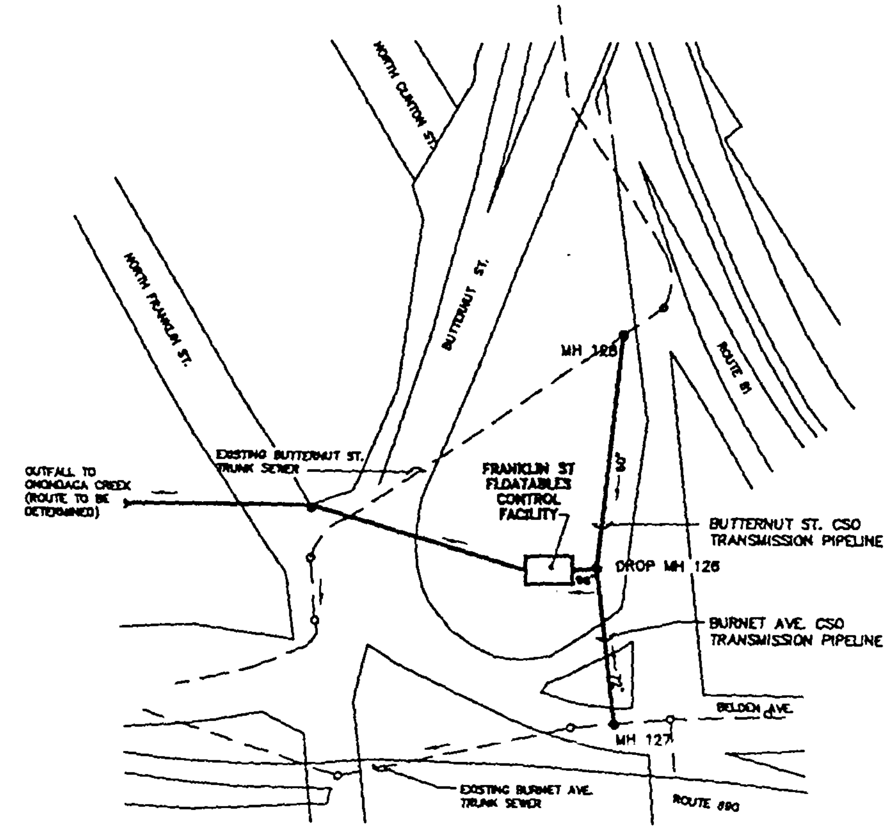
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION

FIGURE 5 - 22
JEFFERSON STREET
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

L: ON = *; OFF = REF
P: DJC-P-8.PCP
1/96 54-- NES RLP NES
18807036/18807G23.DWG



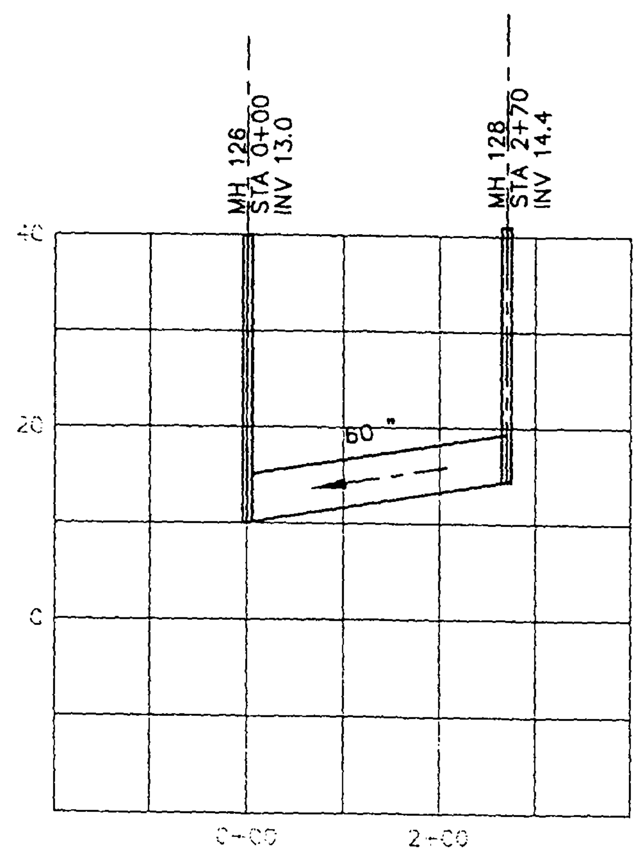
LEGEND

- PROPOSED STRUCTURE
- PROPOSED FORCE MAIN
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- CREEK

NOTES:

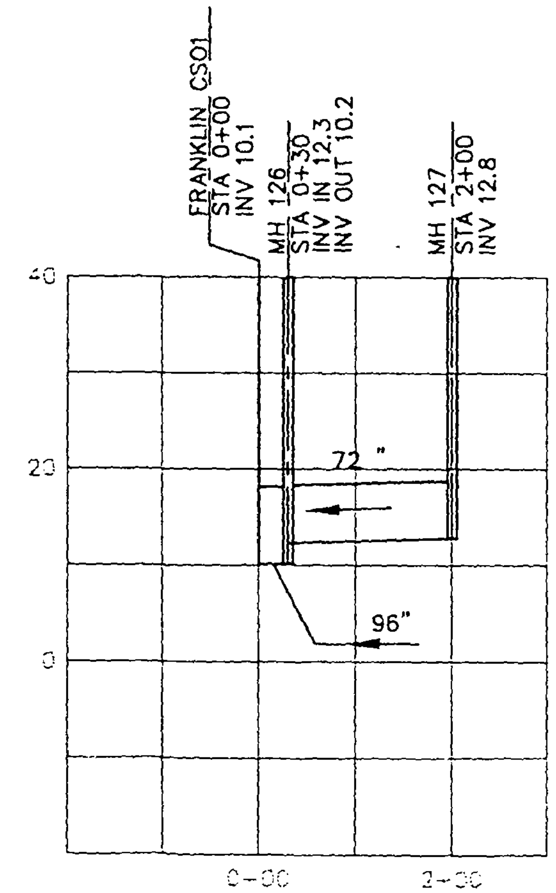
1. BASE MAP INFORMATION TAKEN FROM 1994 SOCPA TAX MAPS.
2. EXISTING AND PROPOSED SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM PRELIMINARY PLANS, COMBINED SEWER OVERFLOW ABATEMENT PROGRAM PREPARED BY O'BRIEN & GERE ENGINEERS, INC., DATED JUNE 1979; MODIFIED AS PER COMBINED SEWER OVERFLOW FACILITIES PLAN BY MOFFA & ASSOCIATES AND BLASLAND & BOUCK ENGINEERS, P.C. DATED FEBRUARY 28, 1991; AND FROM CSO TREATMENT FACILITY SITE PLANS, MUNICIPAL COMPLIANCE PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT, DATED APRIL 1994.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'



BUTTERNUT ST.

SCALE – Horiz: 1" = 200', Vert: 1" = 20'



BURNET AVE.

SCALE – Horiz: 1" = 200', Vert: 1" = 20'

DATE: 1/11/96

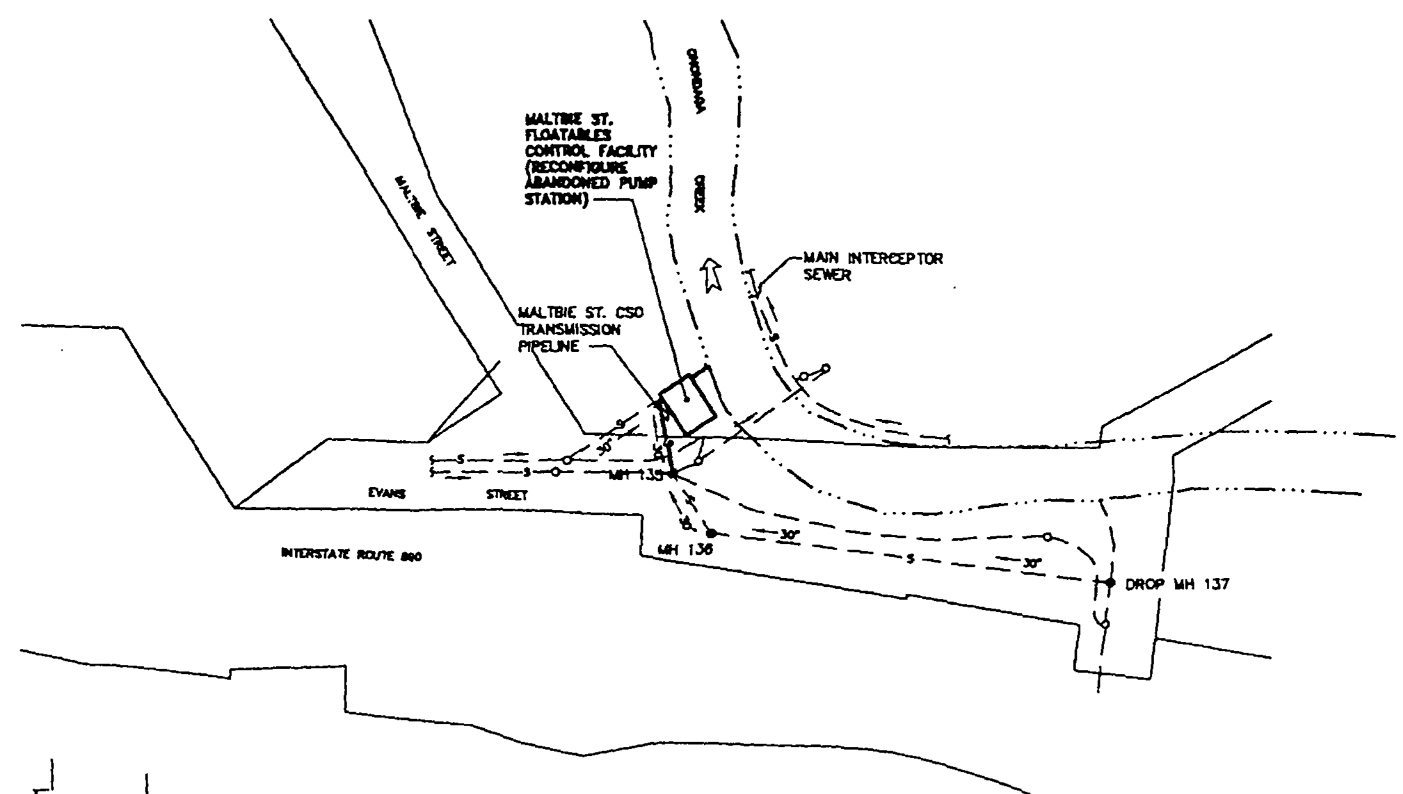
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 5 - 23
BUTTERNUT ST. & BURNET AVE.
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BLASLAND, BOUCK & LEE, INC.

L: ON = * OFF = REF
P: DJC-P-BLPCP
1/96 54- NES RLP NES
18807036/18807G15.DWG



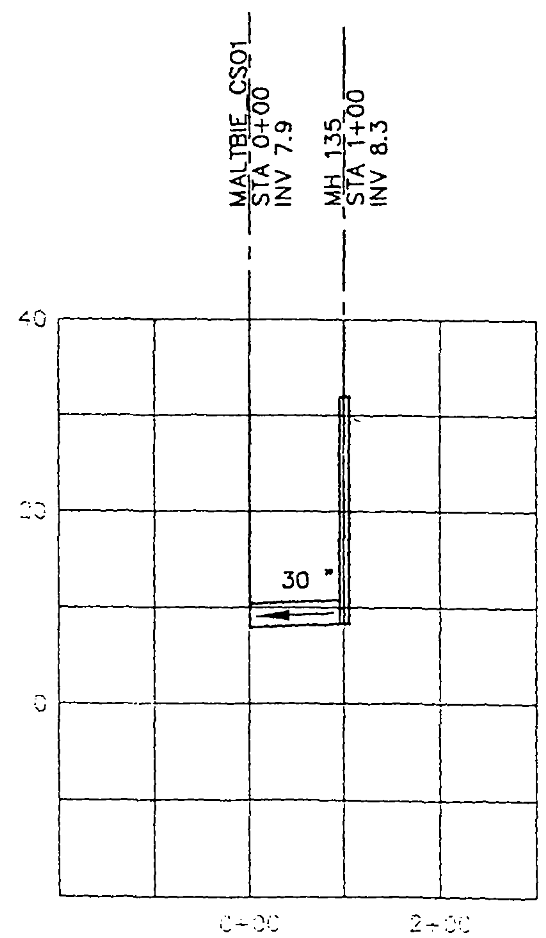
LEGEND

- PROPOSED STRUCTURE
- PROPOSED FORCE MAIN
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED MANHOLE
- EXISTING MANHOLE
- CREEK

NOTES:

1. BASE MAP INFORMATION TAKEN FROM 1994 SOCPA TAX MAPS.
2. EXISTING AND PROPOSED SEWER LOCATIONS ARE APPROXIMATE; TAKEN FROM PRELIMINARY PLANS, COMBINED SEWER OVERFLOW ABATEMENT PROGRAM PREPARED BY O'BRIEN & GERE ENGINEERS, INC., DATED JUNE 1979; MODIFIED AS PER COMBINED SEWER OVERFLOW FACILITIES PLAN BY MOFFA & ASSOCIATES AND BLASLAND & BOUCK ENGINEERS, P.C. DATED FEBRUARY 28, 1991, AND FROM CSO TREATMENT FACILITY SITE PLANS, MUNICIPAL COMPLIANCE PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT, DATED APRIL 1994.

100 50 0 100
APPROXIMATE SCALE: 1" = 200'



MALTBIE ST.

SCALE – Horiz: 1" = 200', Vert: 1" = 20'

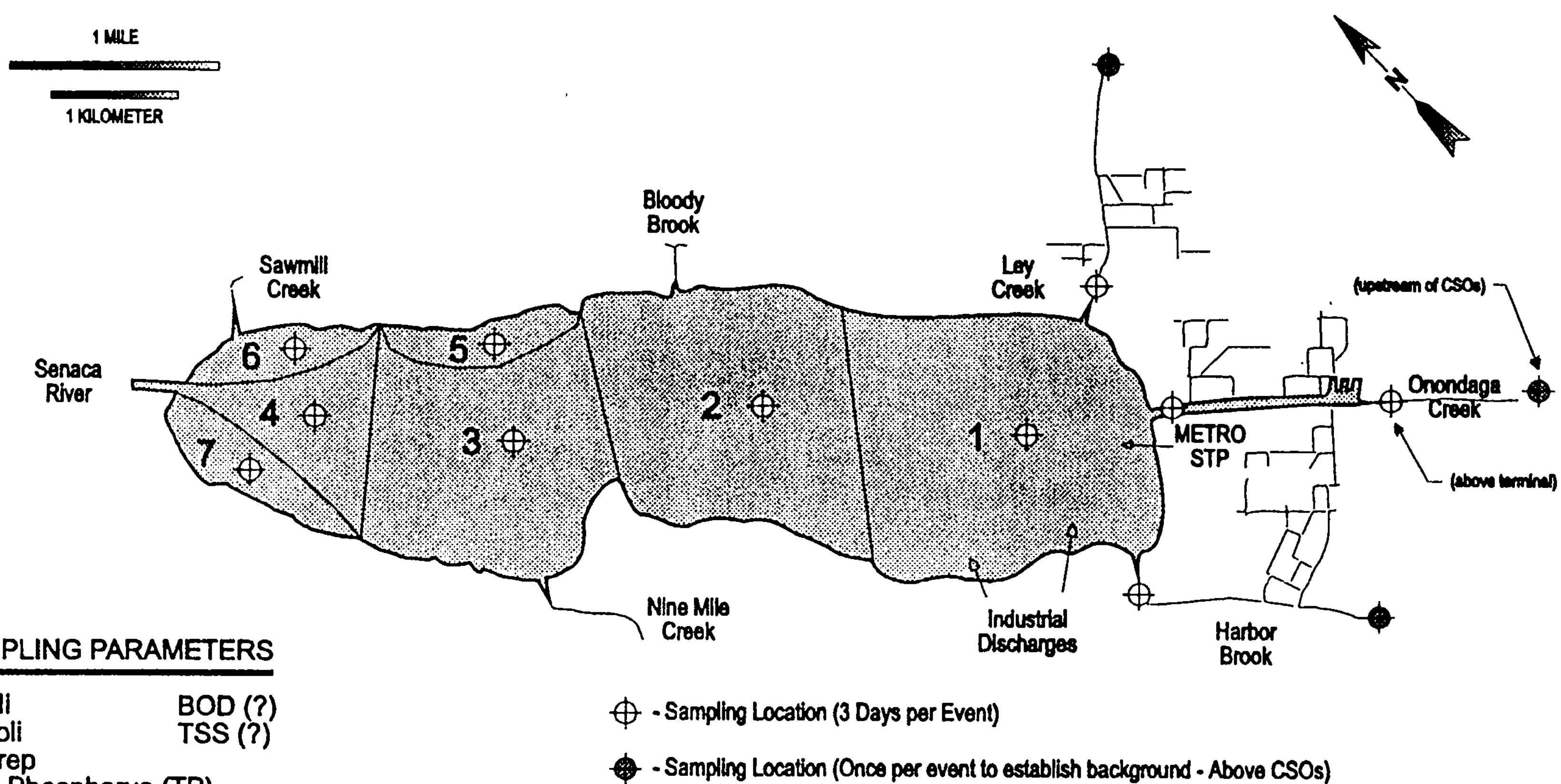
DATE: 1/11/96

MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 5 - 24
MALTBIE STREET
CSO TRANSMISSION PIPELINE
PLAN & PROFILE

MOFFA & ASSOCIATES
CONSULTING ENGINEERS

BBL BLASLAND, BOUCK & LEE, INC.
engineers & scientists



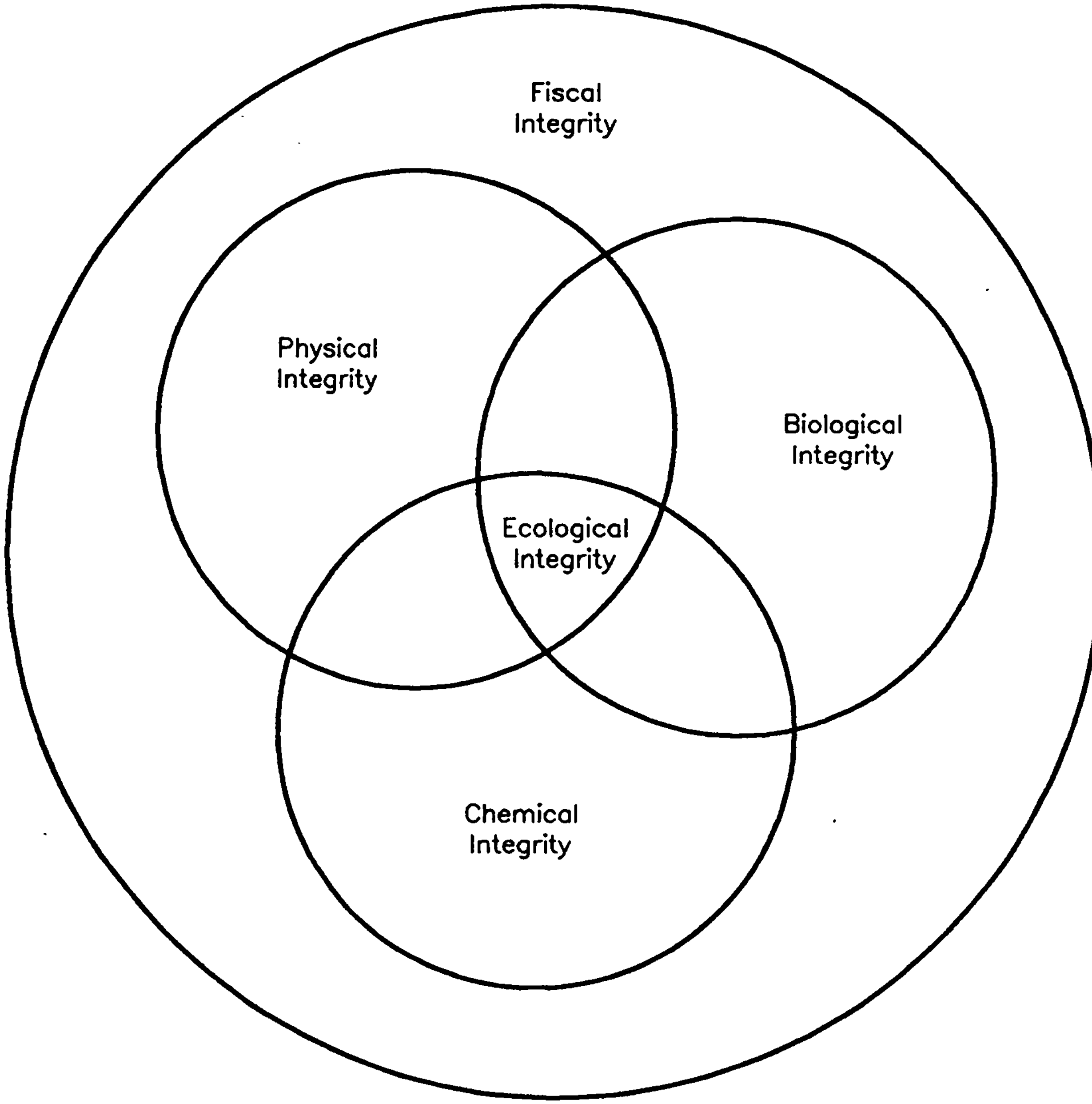
SAMPLING PARAMETERS

F.Coli
E. Coli
F. Strep
Total Phosphorus (TP)
BOD (?)
TSS (?)

SAMPLING CALENDAR (6 Events per Year)

Mid-Spring (April)
Late Spring (May)
Early Summer (June)
Mid-Summer (July)
Mid-Summer (August)
Late Summer (September)

MOFFA & ASSOCIATES CONSULTING ENGINEERS	MUNICIPAL COMPLIANCE PLAN ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION
DATE: 1/11/96	**FIGURE 5 - 26** **PROPOSED CSO ABATEMENT EFFECTIVENESS EVALUATION PROGRAM**



Adapted from: EPA. April 1990. Biological Criteria

Stearns&Wheler ENVIRONMENTAL ENGINEERS & SCIENTISTS	MUNICIPAL COMPLIANCE PLAN ONONDAGA COUNTY DEPARTMENT OF DRAINAGE AND SANITATION
DATE: 1/11/96 JOB No.: 2298	FIGURE 5-25 THE ELEMENTS OF ECOLOGICAL INTEGRITY

Section Six

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CHAPTER 6

IMPLEMENTATION OF THE PROPOSED ACTIONS

6.0 GENERAL

The goal of this MCP is compliance with all applicable state requirements, consistent with the designated uses of the lake and its tributaries, in a cost-effective and prudent manner. The potential adverse financial and economic impacts associated with this goal dictates that the County, on behalf of the Onondaga County Sanitary District ratepayers, insist on all reasonable cost containment measures, and assurances as well as that its investments will actually promote attainment of the lake's designated uses. The County must also aggressively pursue and secure non-County funding, including, where appropriate, funding from other parties whose operations and/or site management have caused or substantially contributed to current conditions.

On August 7, 1995, the Onondaga County Legislature adopted a policy (Resolution 158) setting forth principles to guide County decisions with respect to wastewater collection and treatment upgrades. The objective of this policy is to provide for improved water quality conditions in the lake and its tributaries in a manner which is consistent with the County's legal obligations while seeking to reduce the adverse economic and financial impacts on the County and its citizens. "Fishable and swimmable" is the phrase used to express the environmental vision for Onondaga Lake. "Liveable" is the vision shared by leaders in this County for our residents who expect a reasonable balance between environmental improvements and overall economic viability. Onondaga County policy reflects a balanced plan aimed at maintaining and improving the overall quality of the lives of its residents. The full text of the County policy statement is attached hereto as Attachment 6-1.

Consistent with the directives of the Onondaga County Legislature, the County is proposing to undertake implementation of the plan in phases. At critical junctures during each phase of implementation, the County will assess progress toward compliance with applicable state and federal requirements. The impact of financing the completed projects on user fees and the overall financial and economic health of the community will also be evaluated at these junctures. The outcome of this evaluative process will guide the scope and schedule for implementation of subsequent projects.

If it becomes apparent from the evaluation process that the designated uses for Onondaga Lake cannot be attained and/or that economic and financial conditions dictate a reformulation of one or more of the remaining projects, the scope and/or compliance schedule will be adjusted accordingly. Implementation would then focus on attaining the highest level of benefit achievable at that time.

Likewise, to the extent that other remedial activities result in removing barriers to use attainment, and/or additional financial assistance becomes available, the scope of proposed projects, as well as the compliance schedule, could be adjusted to reflect the changed environmental, financial and economic conditions.

As can be deduced from the proposed project implementation schedules, the County believes that the various project improvements should reasonably span 25 years. This implementation schedule is built upon what the County believes are reasonable expectations of Federal and State funding, and to a lesser extent, other variables; principally, "real world" water quality conditions as compared to model predictions and projected use attainability goals.

This narrative will first discuss the Municipal Compliance Plan in accordance with the County's policy. In order to see how the overall policy is being implemented into detailed projects and time schedules, the actual text of the Legislature's Resolution 158 will be set out (in italics) followed by the corresponding proposal.

6.1 IMPLEMENTATION PLAN

Consistent with County policy, the proposed METRO and CSO project implementation plan reflects a phased approach allowing for any mid-course adjustments indicated by the proposed long-term water quality monitoring and assessment program. Not only is phasing a necessary cost containment measure for the County, it is consistent with the USEPA's phased TMDL approach (build and measure) to water quality improvement.

The plan's interim and intermediate actions correspond to Phase I of County Legislative Policy. These projects address the impacts of METRO and CSO discharges on water quality conditions in Onondaga Lake and its tributaries. Implementation will be performed in parallel with removal of other barriers to use attainment associated with the NPL listing of Onondaga Lake as a Superfund Site under CERCLA.

A. CSO Improvements.

1. Interim Phase.

"Initial emphasis should be placed on identifying and eliminating those CSOs that can be readily abated." (Resolution 158)

Interim projects, in large part, reflect those CSOs that can be most readily abated. Figure 6-1 presents a proposed implementation schedule for CSO improvements. The interim improvements include best management practices (BMPs), capital improvements, and demonstration technologies to reduce the discharge of floatable solids to Onondaga Lake and to establish the basis for design, construction, and operation of subsequent intermediate phase improvements.

The demonstration projects include vortex treatment in combination with storage, a unique in-water treatment application, and alternative disinfection evaluations. The outcome of these full-scale demonstrations will establish the basis of design for much of the intermediate program implementation projects.

The interim projects scheduled to be complete by 2000 will bring about substantial compliance with the ambient water quality requirements for floatables in the lake and Ley Creek. Substantial compliance with water quality standards will be accomplished through floatables control at the mouths of Harbor Brook and Onondaga Creek and at the two individual CSO discharges to Ley Creek. The foregoing projects, which will be undertaken at an estimated cost of $23.4 million (indexed to mid-interim phase, ENR 5870, excluding interest expense), will serve, in the words of the governing Resolution, as a way the County can demonstrate its commitment, show progress and achieve actual water quality improvements, while detailed design and phasing issues of additional CSO abatement projects are resolved.

2. Intermediate Phase.

"Combined sewer overflows. In the first phase, regional treatment facilities for CSOs should be constructed, prioritized according to cost effectiveness. First

phase facilities should involve both the elimination of overflow points and the construction of swirl concentrators at the remaining points. First phase facilities should be constructed without storage, but should be designed to permit retrofitting with storage facilities. " (Resolution 158)

Figure 6-2 presents a proposed implementation schedule for intermediate phase CSO improvements. These projects comprise large consolidation pipe networks to link the many existing CSOs with regional treatment facilities for control of floatable solids, settlable solids, and bacteria.

Full CSO treatment will be provided at the two largest locations, Midland and Clinton. These facilities will treat 80 percent of the total CSO volume remaining after the interim actions. Additionally, floatables control facilities will be constructed at the two remaining regional locations. Fifteen small or remote CSO basins will be separated. The intermediate facility sites do not preclude future additional treatment or storage improvements if deemed necessary at the end of the intermediate phase.

The intermediate projects (Maltbie, Midland, Franklin, and Clinton) will result in substantial compliance with water quality standards for floatable solids in Onondaga Creek. Substantial compliance with ambient water quality standards for bacteria in Onondaga Lake will be achieved upon completion of the Clinton RTF.

The implementation schedule for interim and intermediate CSO projects reflects the need for some flexibility in the actual construction of the individual phases. This is required, in part, by the County's policy of coordinating County and industrial projects, and more importantly, by the need to seek and secure as yet uncertain state and federal aid. The implementation schedule may be adjusted according to the availability of outside aid.

Effectiveness evaluations, coupled with monitoring and assessment described further in this section, will be performed throughout the interim and intermediate phases. At the end of the intermediate phase, it is anticipated that compliance will be attained.

B. **Metropolitan Sewage Treatment Plant Improvements.** Once again, County policy determines the parameters of the proposed compliance plan:

"The first phase operations of the METRO plant should endeavor to maximize the plant's ability to meet site-specific, reasonably achievable dissolved oxygen, ammonia, and phosphorus standards. These improvements should include expanded flow capacity, seasonal ammonia removal, permanent chemical feed facilities for the current phosphorus removal technology, and disinfection facilities." (Resolution 158)

Figure 6-3 presents a proposed implementation schedule for METRO interim improvements. The interim improvements include capital projects, as well as changes in METRO operating strategies, which will focus on maximizing the phosphorus and ammonia removal capabilities of the existing facilities following the anticipated startup of industrial wastewater pretreatment facilities. It is anticipated that the loading reductions, due to wastewater pretreatment by Bristol-Myers Squibb, Inc., will make it possible to increase the magnitude and extend the duration of seasonal ammonia removal at METRO.

In addition, the METRO interim improvements will include a demonstration project to assess the technical feasibility and determine the costs and environmental impacts of hypolimnetic oxygenation of Onondaga Lake. Consideration of hypolimnetic oxygenation has been suggested by the USEPA as a potential low-cost alternative to improve dissolved oxygen concentrations in Onondaga Lake based upon the results of a preliminary evaluation performed by the U.S. Army Corps of Engineers.

The interim METRO projects, which will be undertaken at an estimated cost of $20.9 million (indexed to mid-interim, ENR 5870, excluding interest expense) will serve, in the words of the governing resolution, as a way the County can demonstrate its commitment, show progress, and achieve actual water quality improvements while detailed design and phasing issues of additional CSO abatement and METRO improvement projects are resolved.

The implementation schedule for proposed intermediate METRO improvements is presented in Figure 6-4. Intermediate improvements include a one-quarter plant demonstration project to assess the ammonia removal capabilities of the existing conventional activated sludge system with the elimination of secondary clarifier hydraulic loading limitations and to determine the need and design criteria for fixed-film media to enhance ammonia removal performance. Based upon the results of the ammonia removal demonstration project, final design criteria will be developed for the full-scale upgrade of METRO for year-round ammonia removal. The implementation schedule for final design and construction of the full-scale upgrade may be affected by the availability of outside aid and the extent to which remedial activities related to the NPL remove barriers to use attainment

Intermediate METRO improvements also include the full-scale implementation of hypolimnetic oxygenation for Onondaga Lake based upon the results of the demonstration project conducted during the interim phase. The County's responsibility for full-scale implementation of hypolimnetic oxygenation is limited to the extent to which the METRO and CSO discharges contribute to the cause for dissolved oxygen depletion.

C. Monitoring and Assessment.

> *"In the first phase, the METRO discharge point should remain where it is until the real-world effect of the METRO improvements on Onondaga Lake can be assessed. Thus, decisions regarding deep water discharge or Seneca River discharge should not be made during Phase I. At the same time, facilities should be developed in a way that does not preclude any option."* (Resolution 158)

County policy, and hence this plan, directs that storage facilities may be considered

> *"... only if and when an analysis of the real-world operation of the first phase regional treatment facilities has demonstrated a need for additional remediation. If such need cannot be clearly demonstrated, the second stage should be held in abeyance."* (Resolution 158)

In accordance with legislative directive, monitoring (including biological and chemical measurements) and assessments will be conducted throughout the interim and intermediate actions to determine the degree of compliance. At the end of the intermediate phase, it is anticipated that compliance will be attained. In the event that these actions fall short of compliance, then actions outlined under long-term proposals will be considered.

6.2 PROJECT FINANCING AND AFFORDABILITY

The County Legislature set forth the principles that guide the County's proposed implementation of the MCP and included funding as a vital concern. As stated in the Resolution:

> *"The state and federal governments should participate in financing improvements to the Metropolitan Sewage Treatment Plant and the abatement of CSOs to the extent of providing 75 percent state and federal aid.*
>
> *Local expenditures in the amounts that have been projected for these purposes are not affordable by local taxpayers. In addition the state and federal governments are ultimately responsible for the industrial and environmental policies that created the conditions that now exist in Onondaga Lake and that they also derived substantial economic benefits from these policies."* (Resolution 158)

Highly placed state and federal officials have publicly recognized that the responsibility for Onondaga Lake transcends the boundaries of Onondaga County. Likewise, there have been expressions of support for the concept of shared fiscal responsibility in Albany and Washington, D.C. As of yet , however, no specific levels of state and federal contributions have been pledged. Onondaga County submits this plan, therefore, in the good faith expectation that responsible state and federal officials will move ahead with their efforts to share the expenditures associated with this plan.

A. **Fiscal and Economic Status.** The County Legislature's policy on funding reflects the difficult economic and financial environment that the County's businesses and residents have confronted over the last 10 to 15 years. Detailed below are several important factors that are part of the underpinning of the County Legislature's policy concerning securing non-County funding.

1. The U.S. Census indicated that the County has lost nearly 4,000 people between 1970 and 1990, with the City of Syracuse losing more than 34,000 in the time frame. Estimates since 1990 indicate a small gain in population followed by a decline again in 1994. During the same period, the population of the metropolitan area has increased. Population loss represents lost wealth and income within the County and inhibits the ability to implement the MCP. Continued outmigration of the customer base of the Onondaga County Sanitary District will adversely affect the affordability of the MCP. Recent residential permit data indicate that this trend is continuing, with the number of residential permits for all of 1995 totaling less than 700, as compared to nearly 2,800 in 1987.

2. The income levels of the County's residents are a second related concern. Between 1980 and 1990, median household income in the County grew at a rate 13 percent lower than the statewide average. This is during a period when state income growth failed to keep up with national trends. This stagnant income growth was accompanied with a 15 percent increase in the proportion of the County's population below the poverty level. The situation in the City of Syracuse is especially severe, where more than one third of all County households live. Within the City, the percentage of the population below the poverty level has increased by more than 60 percent between 1970 and 1990, from 14 percent of the population to nearly 23 percent of the population, All recent data continue to indicate that income levels in the County, and especially within the City, will continue to lag behind the state and the rest of the

nation. Income levels and the expectation that income growth will stagnate are clearly major hurdles to the County's ability to implement the MCP.

3. Onondaga County has not followed the national economy into recovery from the 1991 recession. The New York State Department of Labor estimates employment at the end of 1995 to be *12,000 fewer* than the 1990 peak, with an increase in service sector jobs and a decline in all other sectors. Manufacturing accounts for 5,400 of the lost jobs. The rate of change in wages in Onondaga County over the last 10 years ranks the County 39 among New York state counties, far below its rank of 10 in population and employment.

4. The bond rating agencies have indicated discomfort with the debt load of the County, which could result in the County's rating being downgraded, such as recently occurred within the City of Syracuse. A downgrade will directly increase the total cost of government and limit future flexibility to meet presently unanticipated events.

5. Based on data developed by the USEPA and the Bureau of Census, the County believes that its residents are already subjected to use fees significantly higher than those faced by most communities in the country. Presently, residents pay 0.8 percent of their median income for sewer use fees, compared to a national average of approximately 0.6 percent.

6. The tax environment of New York State has been and continues to be a major hindrance to economic growth within the County. According to the U.S. Commerce Department, New York State is the most heavily taxed state in the United States (except for Alaska, which is a special case due to its large oil tax revenues which the state uses to subsidize local taxes). New York State and local taxes come to $4,362 per capita, compared to the national average of $2,967. Therefore, New York State residents have state and local taxes that are 62 percent more than the national average and 22 percent more than the next most expensive state. As a percentage of income, the average County resident pays twice as much of their income on state and local taxes as the average American resident.

These economic and demographic trends are the result of the interplay of a wide range of local, national, and international factors. Many of these are beyond the ability of the state or County to influence and affect. Requiring the County to implement the MCP without providing requisite financial assistance will cause sanitary district fees to reach unacceptable levels and will be destructive to the community's economic stability and the long-term opportunities for growth and prosperity. Only with funding consistent with the County Legislature's policy will the County be able to implement the MCP without causing severe economic and financial hardships.

B. **Project Costs.** The projected impacts *assume that the County is required to implement the MCP without substantial outside financial assistance*. The project is divided into two parts, the interim and intermediate phases, requiring total funding over the life of the project of $536 million, excluding interest costs. With interest costs included, the total project costs will exceed $1.1 billion (see Appendix E for greater details).

C. **Phasing.** Phasing of the project serves several related purposes. First, consistent with the TMDL process, it provides an opportunity to assess the effectiveness of the County's control programs in tandem with other actions required to attain designated uses of the lake. Second, phasing seeks to lessen the disruptive impact on the County's ratepayers and is a device to reduce the severe adverse financial and economic impacts that will be result from MCP implementation without substantial outside financial assistance. The County's proposed 25-year implementation schedule, consistent with the County Legislature's policy, is believed to be a prudent phasing schedule that helps reduce, in part, user fees that otherwise will be unacceptably high and/or increasing rapidly, placing the community in jeopardy of losing even more jobs, population, and tax base. Third, phasing provides for equity. Remediation needs are the result of multiple generations of activity concerning the lake. The current generation should not be asked to pay for the entire remediation.

Beyond the direct effects, the MCP threatens to adversely impact the County's other capital borrowing needs. Adverse impacts on other capital borrowing needs will occur when the community approaches its practical borrowing limits and is precluded from borrowing for certain purposes. Moody's Investors Service has indicated that the County already has a high debt level and would expect the County to moderate its debt levels. (For a more detailed discussion of the County's credit quality and issues related to indebtedness, see Appendix E.) Finally, prudent phasing is less likely to cause the County's double A (AA) credit rating to be reduced, which typically increases debt service costs, reduces market access, and hinders the County's ability to address future needs.

Phasing is also prudent in terms of administering large capital construction projects. Whether the present administrative structure is maintained or a new authority is created, phased construction is necessary. The Drainage and Sanitation Department currently manages capital construction projects that amount to approximately $15 million annually. The proposed 25-year implementation schedule would, in many cases, double the annual project dollars that need to be managed and administered. Furthermore, accelerating the construction schedule would heighten the concern of the bond markets over the County's ability to fund, construct, and manage the MCP projects, in part due to the lack of a track record of managing a project the size and scope of the MCP. This heightened concern could limit market access to capital funds and/or increase interest costs. Therefore, the County has serious reservations concerning accelerating the implementation schedule.

D. **Funding Sources.** It is assumed that the County will finance its share of the MCP costs by issuing general obligation bonds since it has no other legal means to issue debt. At a later date, if an authority is created, the County could issue revenue bonds. Given the experience of other communities in the state, it is possible that obtaining approval for an authority could take 7 to 10 years. In either case, a revenue bond-type structure supported by user fees allocated to the drainage district is utilized to calculate the household bills. The County is very concerned that the economic and financial difficulties resulting from the MCP implementation will result in a dissolution of the Onondaga County Sanitary District to just the METRO Service Area of the current consolidated district. (See Figure 6-5 for a map of the Onondaga County Sanitary District and the METRO Service Area.) This could effectively preclude implementation of the MCP and is discussed in Section 6.2E4 of this chapter. (For a more detailed description concerning funding of the MCP projects and impacts of projects costs when allocated only to the METRO Service Area, see Appendix E.)

E. **Impact on Sewer Use Charges.** Without significant outside financial assistance, MCP implementation will mean unacceptably rapid increases in user fees for services. Projected household bills are constructed by adding charges for service under the current system; any local retail charges (charges for the local collection system), which typically range from $0 to $600 per single-family residence; and the MCP increment, an estimate of the cost per household for MCP improvements. In 1995, users pay $216 in annual fees per year to the County and an estimated $61 in local retail charges, resulting in a total bill of $277. In 2005, assuming for illustrative purposes only no additional financing assistance, charges for service under the existing system are estimated to be $412 and local retail charges are estimated at $106. The MCP increment is estimated at $153, or 23 percent of the total bill of $671. In 2015, estimated fees under the existing system rise to $777, while local charges rise to $182. The MCP increment becomes a larger share of the bill, rising to $434, or 31 percent of the $1,393 total charge. The increasing household charges continue to rise to $1,708 in 2020. (See Table 6-1 and Appendix E for household bill projection details.) These projected household bills represent a doubling of the real burden being imposed on local ratepayers. These bills are believed to be beyond the capacity of our ratepayers and will result in economic and financial dislocations.

F. **Financial Affordability.** There are significant factors, outside the control of the County, that will directly affect the ability of the County to afford to implement the MCP. These include the general state of the economy, demographic and income characteristics of the County's taxpayers, and the ability of the County to access the financial markets to obtain capital necessary to pay construction costs. In addition, it is conceivable that the Onondaga County Sanitary District could dissolve along wastewater treatment plant service areas. That would leave the residents and businesses in the METRO Service Area with the sole financial responsibility for implementing the MCP. A METRO Service Area only district would face significant hurdles in implementing the MCP. Each of these issues are addressed below.

1. **Outmigration.** Without significant outside financial assistance, the costs for implementing the MCP would need to be paid from user fees assessed to customers of the Onondaga County Sanitary District. Thus, the number of residents in the service area and their anticipated income levels are key factors in accessing affordability. If the County implements the MCP without significant outside financial assistance, and the disparity in fees and taxes between Onondaga County and other parts of the metropolitan area increase, pressures for outmigration will likely accelerate further exacerbating affordability concerns. Further reductions in the County's population means that the increased costs associated with the MCP will be allocated to fewer and fewer persons, directly increasing the per capita burden. Below are a number of factors relevant to this assessment.

a. Population in 1990 was smaller than in 1970. Estimates since 1990 indicate that the County's population experienced a small gain and then declined again in 1994. The population of the metropolitan area has increased. This suggests a continued outmigration from the customer base of the Onondaga County Sanitary District.

b. Commuting patterns reflect migration and lower costs of living in surrounding counties. Onondaga County provides jobs for 41,000 workers who commute, mostly from Madison and Oswego Counties. This trend would likely be exacerbated with dramatically higher sewer use bills.

c. Currently, 11,700 County residents work in surrounding counties. Should the cost of living here rise sharply, their is high potential that they would relocate outside the sanitary district.

d. Within Onondaga County, over 87 percent of the acreage is not subject to the user fees, providing ample opportunity to relocatewithin the County but outside the sanitary district.

e. Recent residential permit data suggests that the outmigration trend is continuing with the number of residential permits for all of 1995 totaling less than 700, as compared to nearly 2,800 in 1987.

2. **Economic Impacts.** Implementation of the MCP without significant outside financial assistance will cause the County to increase fees on residents and businesses. These higher fees will have a direct adverse economic impact on employment, population, and income within the County, further exacerbating the County's concerns regarding implementation. As indicated in Section 6.2A of this chapter, Onondaga County has not followed the national economy into recovery from the 1991 recession, and the rate of increase in wages over the last 10 years ranks the County 39 among New York State counties. Implementation of the MCP is likely to worsen these trends. The County has evaluated the potential economic impacts of the MCP without significant outside financial assistance. That analysis concluded that, all other things being equal, implementation of the MCP will cause employment levels to drop by more than 1,700 (see Appendix E). Employment loss of this magnitude would be similar to the County losing a company the size of Welch Allyn or Lockheed-Martin. Such a loss would be very difficult for the community. It is also estimated that population will drop by

over 3,700 people (Appendix E). It must be emphasized that these figures are in addition to the recent decline in population and employment within the County independent of the MCP and assume no further shocks to the local economy or any additional increases in local tax burden. This assumption may prove to be overly optimistic given continued and possibly accelerating worldwide corporate restructuring, putting further pressure on the regional economy.

3. **Local Government Fiscal Pressures**. Federal government efforts to eliminate the national deficit will likely leave local governments with increased responsibilities, but with reduced financial support. Proposed changes in federal and state budgets are expected to decrease assistance to County and local governments and school districts while shifting more of the burden for human services to localities. Currently, over 87 percent of the 1995 budget was devoted to providing human services. Most of these services are mandated by higher levels of government.

The net effect is that local revenues, i.e., taxes, will need to be increased to maintain levels of public service presently provided. Most sources of County revenues are already stressed. Sales tax revenues have not kept pace with inflation, and declining real estate markets have severely reduced mortgage tax receipts. Concern also exists about the property tax base. In 1995, the number of houses on the Realtor's Multiple Listing Service has doubled, while the average sales prices have consistently fallen below prior levels. Recent distress in the commercial and residential real estate market will begin to be reflected in the County's full value assessment over the next two years; taxable full value, based on the state equalization rate, effectively lags two years behind the market.

4. **Rate Affordability and Debt Capacity.** The preceding trends underscore the County's concerns regarding the projected affordability of the MCP on residents and businesses and the County's ability to finance the necessary improvements without hampering its ability to address other municipal responsibilities. Below are impacts that would result from the County being required to implement the MCP without outside financial assistance:

a. Rates for the median income household in the County will increase from approximately $282 in 1996 to over $1,700 by the year 2020. This represents an average annual increase of over 7.6 percent, or a cumulative increase of approximately 490 percent. During the same time period, the County is projecting that household income will increase at a 4.5 percent annual rate, or a cumulative increase of 187 percent. *Thus, the real cost of sewer service is projected to more than double.*

b. Rate increases are expected to be especially sharp during the period 1995 to 2005, with average annual increases exceeding 9 percent per year. This rate of increase is likely to cause significant financial and economic hardships undermining general support for the MCP.

c. The level of household bills further underscores the County's concerns regarding affordability. Typical household bills are projected to increase from 0.8 percent of median household income in 1995 to over 1.63 percent in 2015. The USEPA affordability guidance document indicates that affordability becomes a concern when sewer user fees exceed 1.0 percent to 1.5 percent of median household income. Consequently, projected rates will exceed the USEPA's affordability guidance document for the typical County resident by as much as 63 percent. This problem is especially acute for the typical city resident, where the bill is projected to peak at nearly 2.5 percent of median household income, nearly 67 percent above USEPA's affordability guidance criterion (see Figure 6-6).

d. Similarly as mentioned, a large and likely growing share of the City's population is at or below the poverty level. The burden on these households is even more significant, with projected bills peaking at approximately 3 percent of household income.

These bills are believed to be beyond the capacity of our ratepayers and will result in economic and financial dislocations. The County does not believe that rate increases of this magnitude are sustainable financially or economically, given the large burden currently imposed on ratepayers, general uncertainties regarding the economy, and the other factors previously discussed. Other entities faced with increases of similar magnitude have only been able to sustain public support and continue their program with the addition of significant outside financial assistance.

It is important to understand that the County is already paying higher sewer bills than those of the typical community across the country. Based on a survey conducted by USEPA Region I focused on high cost communities, the average household in communities included in that survey paid approximately 0.6 percent of income for sewer or 30 percent less than the bill presently borne by the County's residents.. Data from the US Department of Commerce, Bureau of Economic Analysis, estimates that the combined bill for water and sanitary services represent 0.6 percent of income. Thus, the typical sewer bill is likely to be significantly less than 0.6 percent of median household income.

The financial markets will play a significant role in the County's ability to implement the MCP. Should the County be required to finance significant amounts to implement the MCP, it would require borrowing of over $535 million in future dollars. This will represent a doubling of the County's total outstanding debt and reflects the needs of just one municipal function -- wastewater -- as compared to the County's broad total needs. The County anticipates that it will be difficult to obtain the funding necessary for the MCP through the public markets without experiencing significant penalties, such as a rating downgrade.

The County presently has a double A (AA) rating, or its equivalent, from the major bond rating agencies. However, in the agencies' reports regarding the County, all have expressed concerns regarding the County's high debt levels per capita and debt relative to equalized full valuations. The rating agencies are anticipating that these levels will decline in the future. However, if the County is required to finance the MCP without outside financial assistance, debt per capita will exceed $850 per capita, compared to the Moody's median of $312. Direct net debt relative to equalized value will exceed 0.9 percent, which is 20 percent higher than the Moody's median. Consequently, the County believes that financing the MCP will cause the County to experience a bond rating downgrade, potentially significant. This will result in the County paying higher interest rates for all its debt. A downgrade will significantly increase the interest cost for all County debt. Depending on the magnitude of the downgrade, the County could find market access effectively denied or, at least severely constrained. This would inhibit the County's ability to fulfill its responsibilities.

The City of Syracuse's recent experience is illustrative of the potential difficulties facing the County. Moody's Investor Services lowered the City's bond rating from AA to A1 in August

1994. The key factors causing the downgrade included: (1) retrenchment in key industries and an associated contraction in employment levels which have caused rising and high unemployment levels and declining wealth indicators; and (2) financial pressures which have increased as general fund balances have declined and deficits have increased due to cuts in state aid, weaker sales tax growth and contraction of the property tax base.

Clearly, there are direct implications for the County's own credit standing to be drawn from the City's experience. One of the key factors is the downgrade centered on the shrinking and weakened economic base. Furthermore, the reverberations of this economic malaise, on revenues and population, both of which have declined, carry implications for the County itself. This is further complicated by the anticipated cutback in federal and state assistance. The City's bond rating downgrade may very well be a leading indicator of future actions on the County's bond rating, since the City comprises a significant portion of the County population and tax base.

5. **Dissolution of the District.** The preceding analysis assumes that the County is required to implement the MCP and for it to be supported by the ratepayers of the entire Onondaga County Sanitary District. However, the METRO Service Area is the only area of the Onondaga County Sanitary District that is affected by the MCP (see Figure 6-5). The Onondaga County Sanitary District was created by an act of the County Legislature and may be dissolved by the County Legislature. With the limited benefits accruing from the MCP, the County believes that significant pressure will arise to dissolve the sanitary district. If this were to occur, the financial feasibility of implementing the MCP will become significantly more difficult.

a. The METRO Service Area has a population of approximately 60 percent of the entire County. Income levels in the METRO Service Area are approximately 13 percent less than in the County as a whole. Consequently, the user fee burden on the residents of a METRO Service area will be over 2.5 percent of median household income, two thirds above the USEPA affordability criterion.

b. The economic prospects for the METRO Service Area are significantly less than for the County as a whole. The City of Syracuse, the major location of poverty in the

County, is within the METRO Service area and represents more than 60 percent of the service area's population.

c. A METRO Service Area only district would face huge, possibly unsurmountable, barriers in obtaining the capital financing necessary to implement the MCP. The district would have a smaller, less well off population base, undertaking a huge capital program for the first time. Access to the capital markets would be extremely limited and would likely constrain the proportion of the MCP that could be financed.

6. **Outside Financial Assistance.** The County strongly believes the need for such assistance is imperative. The County's projected sewer use rates will be considerably higher when compared to other major metropolitan areas in the state, and the burden they will impose on the County's residents, especially within the City of Syracuse, will be substantial. The result may well be the dissolution of the Onondaga County Sanitary District and the creation of a METRO Service Area District. If this were to occur, the costs on sewer users would be even more dramatic. If the METRO Service Area users were required to pay for all the project costs, already high sewer use fees would increase by approximately 30 percent. It should be noted that even with the proposed implementation period of 25 years, the projected sewer rates in the County will exceed USEPA's affordability standard, and those of residents in the City will be significantly above the affordability threshold.

Needed financial assistance for the MCP could take at least three forms:

a. Direct federal assistance through grants, such as those that have been provided to the Massachusetts Water Resources Authority, San Diego, CA, and others. These grants are similar to the old Construction Grant Program, where the federal government directly pays for some or all of the costs associated with a mandated wastewater project.

b. Direct state assistance such as that presently provided by a number of states. As an example, the Commonwealth of Massachusetts presently pays 20 percent of the debt service incurred by local communities associated with wastewater projects to mitigate the affordability and financing difficulties facing many communities with mandated projects.

c. State Revolving Loan Fund (SRF) assistance, whereby the County could borrow significant portions of the MCP cost through the SRF. The SRF provides no interest loans. Small communities experiencing hardship are the typical recipients of these loans. However, the EFC has the ability to modify the guidelines used to administer these loans. Use of no interest loans could dramatically reduce the cost to the Onondaga County Sanitary District ratepayers. The SRF also provides subsidized financing through reducing the interest cost to a rate approximately equal to two-thirds of the market rate. Use of this mechanism would marginally reduce the user fees.

Given the present budgetary upheaval at the federal level, it is difficult to project what types of federal assistance may be available for projects such as the MCP. This also carries over to the SRF. The amounts potentially available for funding depend upon reauthorization of the Clean Water Act and the amount eventually appropriated to provide additional loan amounts. Under the most optimistic circumstances, given full reauthorization and limited demand for funding within New York State, the County is unlikely to be able to finance more than 50 percent of its project costs through the SRF. A more likely case is SRF funding will be limited to approximately 10 to 20 percent of financing requirements. State grants are also viewed as unlikely at this time. However, they remain a key ingredient in the County's ability to implement the MCP without causing significant financial and economic damage.

6.3 APPROVALS NEEDED

Upon completion of the SEQR process and the issuance of permits, Onondaga County will commence implementation of the interim and intermediate METRO and CSO improvements which comprise the Municipal Compliance Plan. It will be necessary to obtain site-specific project construction-related approvals for funding, environmental impact, and mitigation and work within street and highway rights-of-way. It will be necessary to complete site-specific supplemental EIS documents prior to implementation of intermediate CSO projects. Figure 6-7 summarizes permits and approvals which will be needed in connection with project implementation.

A. **Environmental Permits - City of Syracuse.**

1. **Floodprone Area Permit.** City of Syracuse; required under National Flood Insurance Act of 1968; Federal Flood Disaster Protection Act of 1978; New York State Environmental Conservation Article 36; Flood Protection Code, City of Syracuse.

B. **Environmental Permits - State of New York.**

1. **SPDES (NYSDEC).** Pollutant Discharge Elimination System Permit, New York State Environmental Conservation Law, Article 17, Titles 7 and 8; NYCRR Title 6 Parts 621 and 750-757.

2. **Freshwater Wetland Permits (NYSDEC).** New York State Environmental Conservation Law Article 24, NYCRR Title 6 Parts 662-665 for state-regulated wetlands.

3. **Stream Bed or Bank Disturbance Permit (NYSDEC).** New York State Environmental Conservation Law S15-1505, NYSDEC Protected Waters Program.

4. **Dredging and Filling of Waterways (NYSDEC).** New York State Environmental Conservation Law S15-1505, New York State Protected Waters Program.

5. **Water Quality Certification (NYSDEC).** U.S. Public Law 92-500 §401, New York State Codes, Rules, and Regulations Title 6 Part 608.7.

6. **Stream Crossing Permit (NYSDEC).**

7. **Grant for Land** along lake bottom. Office of General Services.

8. **Permit for Buoys Associated with Hypolimnetic Oxygenation Work.** U. S. Coast Guard; New York State Office of Parks, Recreation, Historic Preservation; USACOE; and Thruway Authority are involved agencies.

C. **Environmental Permits - Federal.**

1. **Discharge of Fill Into Water Bodies (Wetlands).** U.S. Army Corps of Engineers, U.S. Clean Water Act §404a, 301a, and 309c, d, and e; River and Harbor Act of 1989 §10; Marine Protection, Research, and Sanctuaries Act of 1972 §1031.

2. **Endangered Species Act (U.S. Fish and Wildlife Services).** Biologic assessment if endangered species present; no permit required.

D. **Transportation Permits.**

1. Highway ROW Construction Permit (City of Syracuse, Bureau of Traffic Engineering).

2. Right-of-Way Occupation and Construction Permit (Onondaga County Department of Transportation).

3. Highway Work Permit: Utility Work (NYSDOT) (Thruway Authority).

E. **Canal.**

1. **Construction in Navigable Waters.** Navigation Aids (33 CFR Part 66) (U.S. Coast Guard) (U.S. Army Corps of Engineers) - U.S. Rivers and Harbors Act of 1989, Section 10.

2. Canal Access and Right-of-Way, New York State Barge Canal (Thruway Authority).

F. **Zoning and Building Permits.** Public permits are exempt from regulation under City of Syracuse zoning ordinance; however, historic districts and protected sites regulations may be relevant to CSO project areas. Building permits are not issued by the City of Syracuse for public projects; however, the project must conform to the New York State Fire Protection and Building Code of 1984 and a permit must be issued by the Onondaga County Department of Facilities Management.

G. **Funding Approvals.** The process of obtaining County approval for funding includes:

1. Capital Improvement Program and Annual Capital Budget.

2. Commissioner's Hearing, County Executive approval, and legislative approval of project design and authorization to incur debt.

In addition, use of the New York State Revolving Fund for water pollution control for capital project financing will require approval of the New York State Environmental Facilities Corporation (NYSEFC).

H. **Creation of an Authority.** If creation of an authority is required to fund implementation of the MCP, approval by the New York State legislature will be required.

TABLE 6-1

PROJECTED HOUSEHOLD BILLS, WITH MCP
Municipal Compliance Plan
Onondaga County, New York

	1996	2000	2005	2010	2015	2020
Existing system	$222	$313	$412	$553	$777	$1,017
Local retail charge	60	81	106	139	182	239
MCP increment	0	42	153	258	434	451
TOTAL	$282	$436	$671	$950	$1,393	$1,708

PROJECT NAME	Project Cost (ENR 5870)	1995	1996	1997	1998	1999
1. Hiawatha RTF Demonstration	7,980,000					
Design Pipelines						
ACOE Contractural Arrangements						
Facility Design						
Regulatory & Environmental Reviews						
Bidding & Execution of Construction Contrac						
Pipeline Construction						
RTF Construction						
Demonstration Testing						
2. Newell Street	1,310,000					
NYSERDA Grant Administration						
Contractural Arrangements						
Facility Design						
Regulatory & Environmental Reviews						
Project Funding Arrangements						
Bidding & Execution of Construction Contrac						
Construction						
Demonstration Testing						
3. Harbor Brook EquiFlow & Wetlands	5,440,000					
EPA Grant Administration						
Contractural Arrangements						
Facility Design						
Regulatory & Environmental Reviews						
Project Funding Arrangements						
Bidding & Execution of Construction Contrac						
Construction						
Demonstration Testing						
4. EBSS Storage Upgrade	2,250,000					
Contractural Arrangements						
Facility Design						
Regulatory & Environmental Reviews						
Project Funding Arrangements						
Bidding & Execution of Construction Contrac						
Construction						
5. Kirkpatrick Street PS Upgrade	5,640,000					
Contractural Arrangements						
Facility Design						
Regulatory & Environmental Reviews						
Project Funding Arrangements						
Bidding & Execution of Construction Contrac						
Construction						
6. Siphon Evaluation	330,000					
7. CSO Toxic Evaluation	300,000					
8. Floatables Entrapment						
A. Teall Ave Trashtrap	180,000					
B. Onondaga Cr. Floatables Boom	(by others)					
9. Non-Point Data Collection	(by others)					
TOTAL COST**	**$23,430,000**					

** Includes some currently authorized projects

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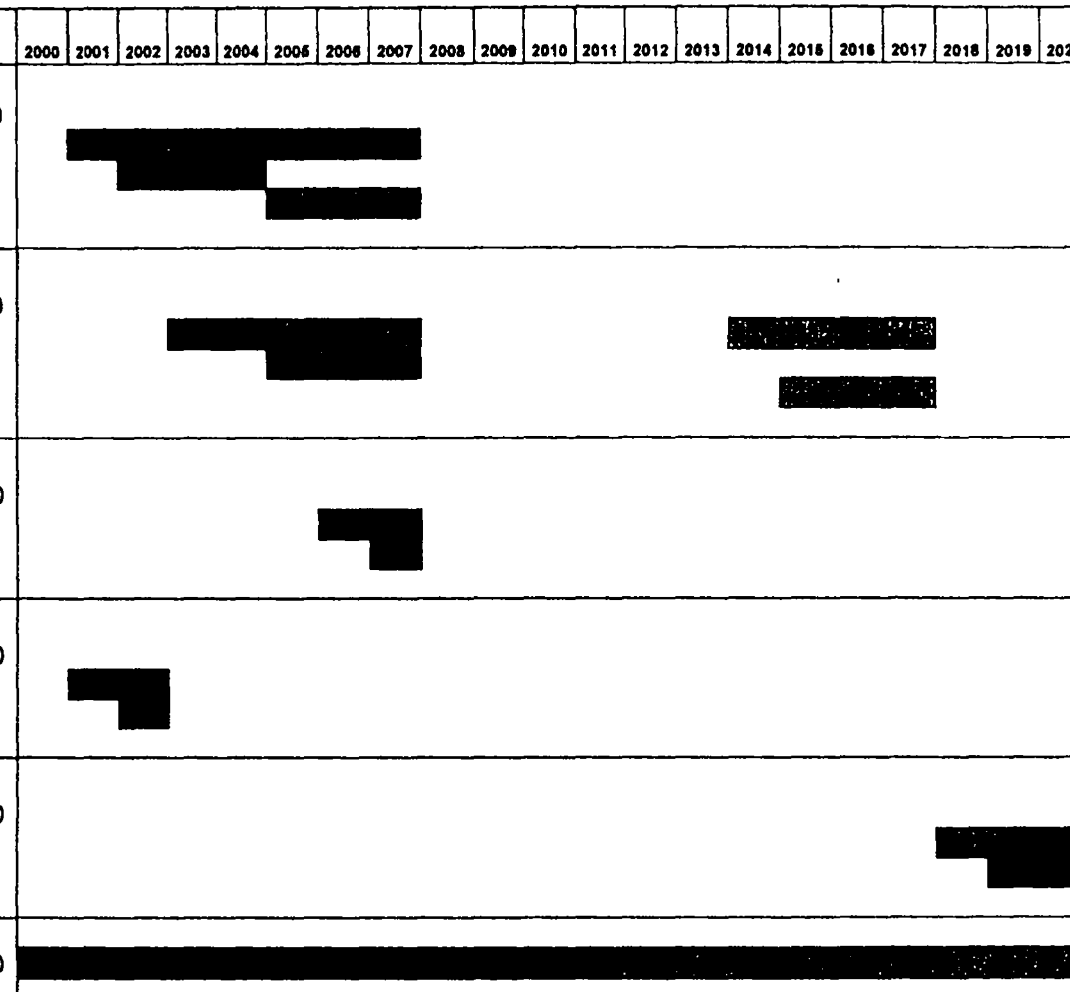
MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 6-1
CSO INTERIM PROJECTS
IMPLEMENTATION SCHEDULE

PROJECT NAME	Project Cost (ENR 5870)
1. Midland RTF	74,530,000
Administration / Engineering	
Pipeline / Floatables Construction	
Regional Treatment Facility Construction	
2. Clinton Station RTF	30,190,000
Administration / Engineering	
Pipeline / Floatables Construction	
Regional Treatment Facility Construction	
3. Franklin Street FCF	3,200,000
Administration / Engineering	
Pipeline / Floatables Construction	
4. Maltbie Street FCF	2,550,000
Administration / Engineering	
Pipeline / Floatables Construction	
5. Sewer Sepatation	8,700,000
Administration / Engineering	
Sewer Separation Projects	
6. Effectiveness Evaluation Monitoring	1,500,000
TOTAL COST	**$120,670,000**



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CONSULTING ENGINEERS

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MUNICIPAL COMPLIANCE PLAN
ONONDAGA COUNTY DEPARTMENT OF
DRAINAGE AND SANITATION

FIGURE 6-2
CSO INTERMEDIATE PROJECTS
IMPLEMENTATION SCHEDULE

	Project Cost (July 1995)	1995	1996	1997	1998	1999
1. SPDES Permit Modification (Phosphorus and Ammonia Cap)						
2. BMS Industrial Wastewater Pretreatment System						
3. METRO Operating Changes						
4. METRO Digital System Improvements	$2,900,000					
Contractual Arrangements						
Design						
Regulatory and Environmental Reviews						
Project Funding Arrangements						
Bidding and Execution of Construction Contracts						
Construction						
5. Residuals Handling and Odor Control Improvements	$7,500,000					
Design						
Regulatory and Environmental Reviews						
Project Funding Arrangements						
Bidding and Execution of Construction Contracts						
Construction and Startup						
6. Digester Modifications/Mechanical Sludge Thickening	$6,700,000					
Preliminary Design - Modifications to Digester No. 4						
Evaluation of Sludge Thickening System Improvements						
Contractual/Project Funding Arrangements						
Final Design						
Regulatory and Environmental Reviews						
Bidding and Execution of Construction Contracts						
Construction and Startup						
7. Other Plant Improvements	$1,400,000					
Design						
Regulatory and Environmental Reviews						
Project Funding Arrangements						
Bidding and Execution of Construction Contracts						
Construction and Startup						
8. Permanent Phosphorus Removal Facilities	$2,400,000					
Contractual/Project Funding Arrangements						
Design						
Regulatory and Environmental Reviews						
Bidding						
Construction and Startup						
9. Monitoring and Assessment of METRO Plant Performance						
Monitoring and Assessment of METRO Performance						
Interim/Final Reports						
10. SPDES Permit Modification (Phase 1 Reductions)						
11. Demonstration Project - Hypolimnetic Oxygenation	not available					
12. Water Quality Monitoring and Assessment Program						
Total Project Cost =	$20,900,000	**				

** Includes some currently authorized projects.

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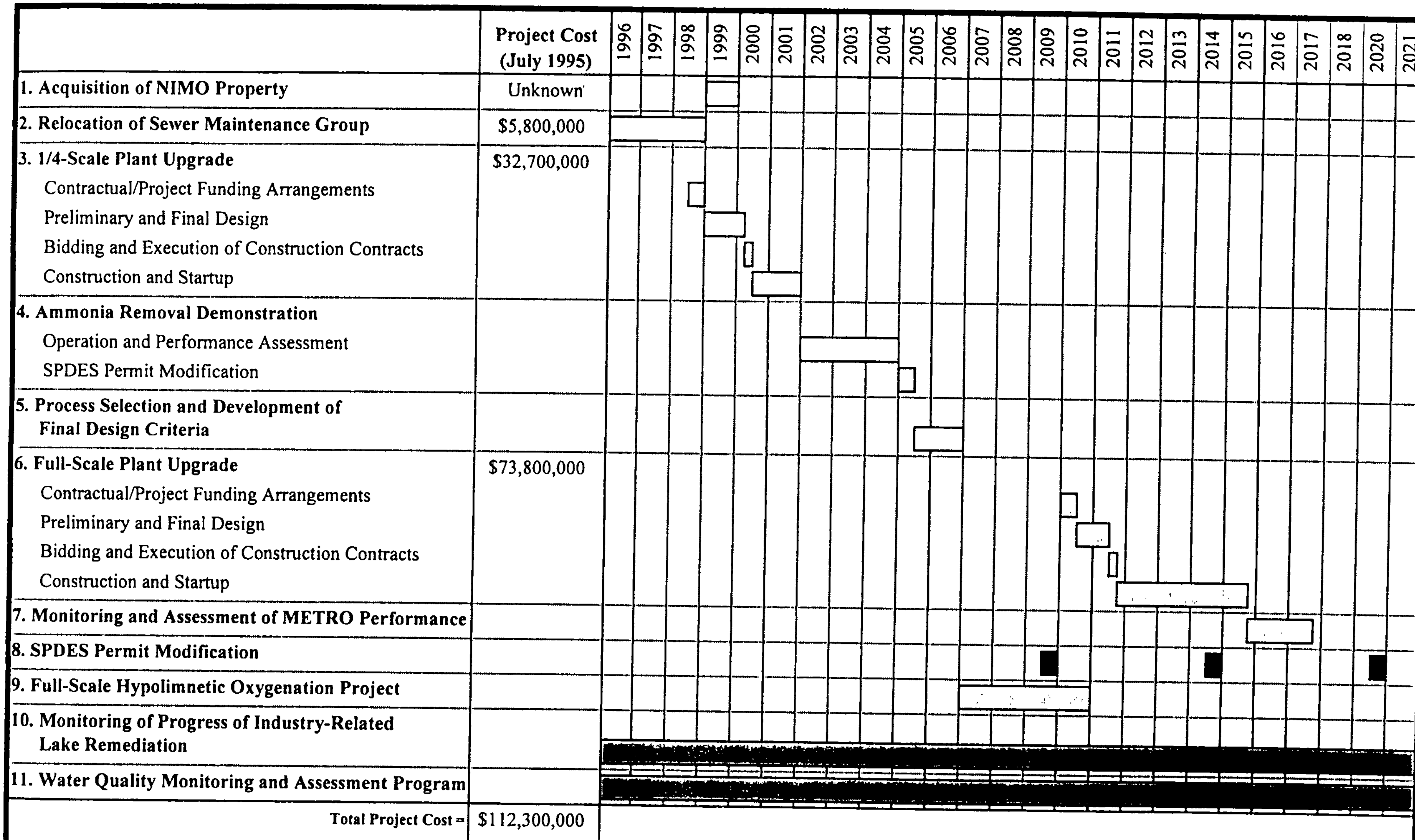
FIGURE 6-3
INTERIM ACTIONS: METRO IMPROVEMENTS



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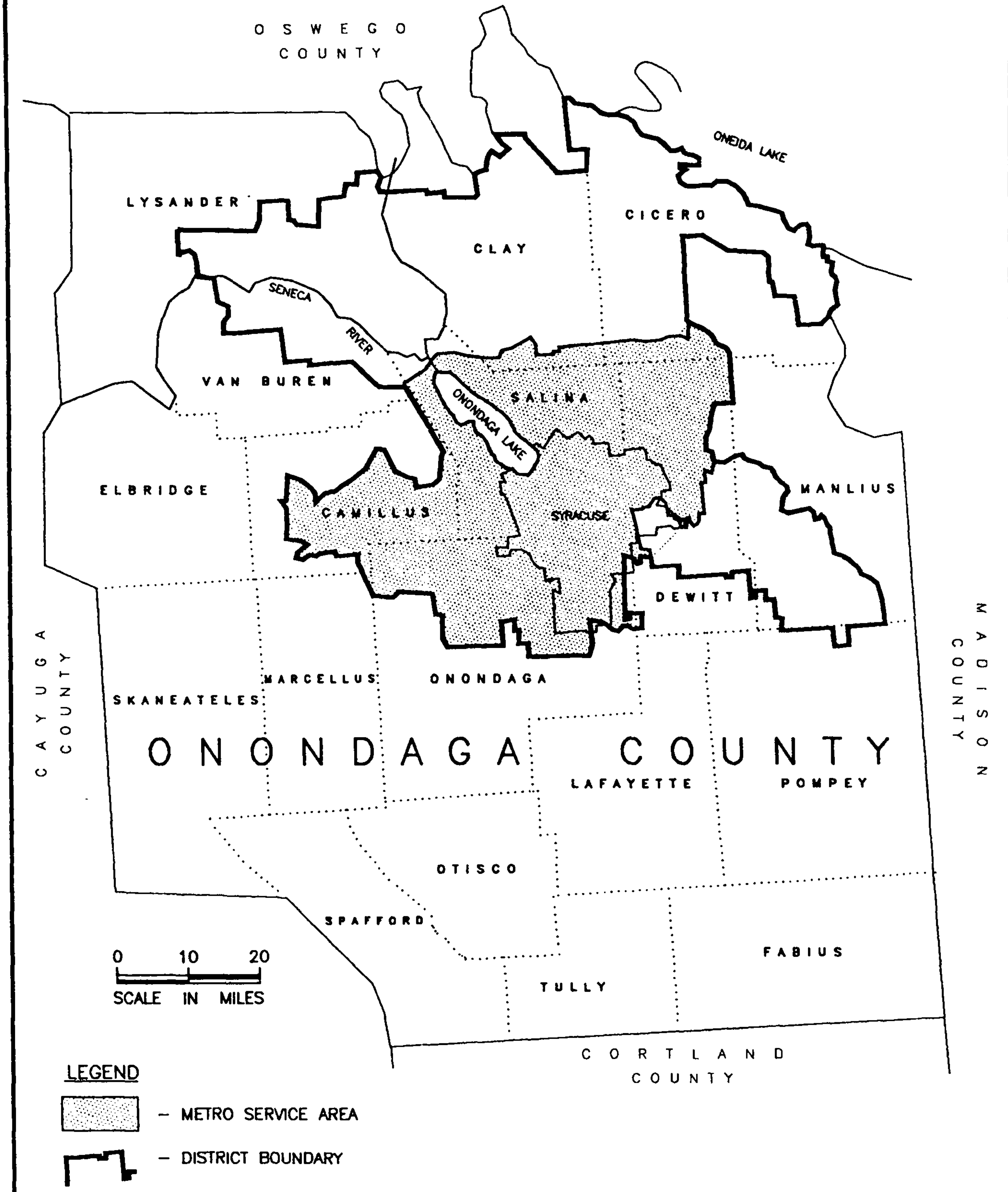
OF DRAINAGE AND SANITATION

FIGURE 6-4
INTERMEDIATE ACTIONS: METRO IMPROVEMENTS



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DRAINAGE AND SANITATION

FIGURE 6–5
ONONDAGA COUNTY SANITARY DISTRICT

Projected Household Bills as a Percentage of Median Household Income

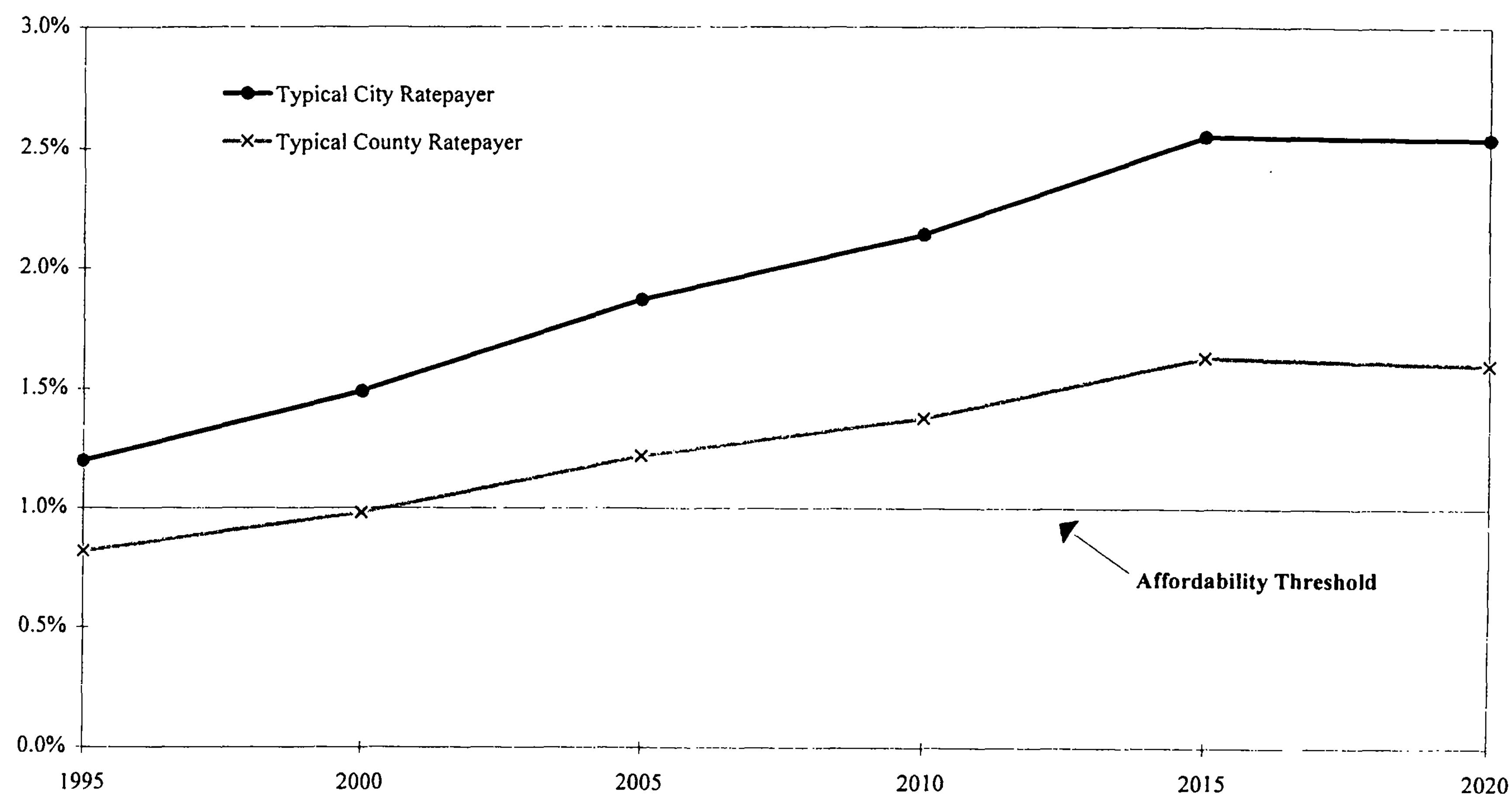

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	FIGURE 6-6 **AFFORDABILITY OF MCP ACTION**

	Harbor Brook		Ley Creek		Onondaga Creek							METRO
	Equiflow™	FCF	Hiawatha RTF	Teall FCF	Onondaga Cree FCF	EBSS	Newell RTF	Midland RTF	Clinton Sta. RTF	Franklin FCF	Maltbie FCF	Improvements
ENVIRONMENTAL PERMITS												
City of Syracuse												
Floodprone Area Permit	✓						✓	✓				✓
State of New York												
SPDES			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Freshwater Wetland Permits	✓		✓									
Streambed or Bank Disturbance	✓	✓		✓	✓		✓	✓	✓	✓	✓	
Stream Crossing								✓	✓			
Dredging & Filling of Waterways	✓	✓			✓							
Water Quality Certification												
Grant for Land												
Buoys for Hypolimnetic Oxygenation												
Federal												
Discharge of Fill (Wetlands)	✓											✓
Endangered Species Act												
TRANSPORTATION PERMITS												
Highway ROW Construction *(City)*						✓		✓	✓			
Street Abandonment *(City)*								✓				
ROW Purchase *(City)*								✓				
CANAL												
Canal Access and ROW *(State)*					✓							
Construction in Navigable Waters *(Fed)*	✓				✓							
ZONING & BUILDING PERMITS												
Facilities Management Permit *(Cty)*	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
FUNDING APPROVALS *(County)*												
Capital Improvement Program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Annual Capital Budget	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Commissioner's Hearing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
County Executive Approval	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Legislative Approval	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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OF DRAINAGE AND SANITATION

FIGURE 6-7
PERMITS AND APPROVALS NEEDED

Onondaga County Legislature Resolution 158

August 7, 1995

Motion Made By Mr. Sanford, Mr. Sweetland, Mr. Warner, Mr. Corbett, Mrs. Goike, Mr. Mitchell, Mr. Pickard

RESOLUTION NO. 000158

ESTABLISHING A POLICY REGARDING THE ABATEMENT OF COMBINED SEWER OVERFLOWS, IMPROVEMENTS TO THE METROPOLITAN SEWAGE TREATMENT PLANT AND ENHANCE THE WATER QUALITY OF ONONDAGA LAKE

WHEREAS, the Onondaga County Charter establishes the County Legislature as the County's policy making, appropriating and governing body; and

WHEREAS, under the Charter, County funds may not be appropriated except pursuant to a resolution of the County Legislature; and

WHEREAS, under the Charter, the County may only issue bonds, notes or other instruments of indebtedness pursuant to a resolution of the County Legislature; and

WHEREAS, the County Legislature is responsible for reviewing and overseeing the work of County departments, including the Department of Drainage and Sanitation; and

WHEREAS, in 1989, Onondaga County agreed to a Consent Decree, under which Onondaga County is required to take a series of steps leading to the formulation of a Municipal Compliance Plan aimed at achieving compliance with final effluent limits to be established by the State; and

WHEREAS, compliance with revised permit limits may require construction of improvements at Metro as well as abatement of combined sewer overflows; and

WHEREAS, pursuant to a revised permit and compliance schedule the County Legislature may be required to approve resolutions authorizing the issuance of indebtedness and the appropriation of funds needed to pay the cost of improvements to the Metropolitan Sewage Treatment Plant, and associated facilities and to abate combined sewer overflows in order to comply with federal and state law, which should enhance water quality in Onondaga Lake; and

WHEREAS, the County Legislature may be requested to approve additional resolutions relating to these matters, including a final Municipal Compliance Plan; and

WHEREAS, it is the desire of this Legislature to establish a policy regarding the abatement of combined sewer overflows and improvements to the Metropolitan Sewage Treatment Plant; now, therefore be it

RESOLVED, that this Legislature establishes as County policy toward the abatement of combined sewer overflows and improvements to the Metropolitan Sewage Treatment Plant the attached Policy Statement, dated August 7, 1995; and, be it further

RESOLVED, that a copy of this resolution be forwarded to the County Executive and the Department of Environmental Conservation.

OLRES1.RES
WES/RJ
/ds

I HEREBY CERTIFY THAT THE FOREGOING IS A TRUE AND EXACT COPY OF LEGISLATION DULY ADOPTED BY THE COUNTY LEGISLATURE OF ONONDAGA COUNTY ON THE 7th DAY OF August 1995.

Nancy J. Skahen
CLERK, COUNTY LEGISLATURE
ONONDAGA COUNTY, NEW YORK

ADOPTED
AUG 07 1995

95 AUG -7 AM 9:06
ONONDAGA COUNTY LEGISLATURE
RECEIVED

POLICY STATEMENT

August 7, 1995

PURPOSE

The purposes of this Policy Statement are as follows:

1. To identify issues regarding both improvements to the Metropolitan Sewage Treatment Plant the abatement of combined sewer overflows (CSOs) about which there is widespread agreement so that action can commence on matters that are not in dispute;

2. To demonstrate the willingness of the Onondaga County Legislature to approve Metropolitan Sewage Treatment Plant improvements and combined sewer overflow (CSO) abatement measures, and to address DEC compliance requirements;

3. To identify opportunities for, and to initiate efforts to obtain, funding from sources outside Onondaga County;

4. To develop a phased approach to the development of Metropolitan Sewage Treatment Plant improvements and CSO abatement that will:

   a. Reduce the negative economic impact of so costly a project by spreading costs over several years;

   b. Permit the assessment of the effects of installed project elements on the actual quality of water in Onondaga Lake throughout the process of constructing improvements, in order to insure that project elements work as intended;

   c. Enable project planners and regulators to conduct an integrated compliance process, rather than focusing on isolated projects.

PRINCIPLES

1. The state and federal governments should participate in financing improvements to the Metropolitan Sewage Treatment Plant and the abatement of CSOs to the extent of providing 75 per cent state and federal aid.

Local expenditures in the amounts that have been projected for these purposes are not affordable by local taxpayers. In addition, the state and federal governments are ultimately responsible for the industrial and environmental policies that created the conditions that now exist in Onondaga Lake and that they also derived substantial economic benefits from these policies. As regulators, the state and federal governments approved and/or acquiesced in these industrial and economic policies. As consumers of goods produced by industries within the Metro service area, the federal and state governments both benefited from the lower prices and tax revenues made possible by these industrial and economic policies.

2. Costs should be related to benefits. If local taxpayers are to be expected to pay substantial additional sums per year per household in additional sewer costs, they need to be assured that Onondaga Lake will find significantly higher uses than at present.

3. County and industrial projects should be coordinated.

Water from the combined sewer overflows and treated effluent from the Metropolitan Sewage Treatment Plant are not the only sources of pollution in Onondaga Lake. Industrial contaminants continue to leach and flow into the lake. These contaminants include hazardous wastes such as mercury, benzene, chlorobenzene and PCBs. If Onondaga Lake is to find higher uses than at present, this source of pollution must be abated in a coordinated process.

4. Achievable discharge standards should be developed and applied to discharges into Onondaga Lake. To secure cost-effective environmental improvements, maintain affordability and promote finality, regulators should develop and apply site specific and seasonal standards.

Taxpayers need to be assured that the plan which is adopted is final and not merely the beginning of an unbounded, never ending, ever expanding program of construction needed to satisfy an endless quest for an ever higher standard of purity for Onondaga Lake. Since federal law gives special interest groups the right to sue to enforce standards, only clearly achievable standards can provide this assurance.

5. Improvements to the Metropolitan Sewage Treatment Plant and CSOs should be implemented in phases.

Once the first phase of each project is completed, operation of the facilities should be carefully monitored and data should be collected for a period sufficient to ensure that the impact of the facilities on Onondaga Lake has been accurately measured on a year-round basis. As this data is developed, it should be compared with the results predicted by the Onondaga Lake Models, in order to validate the Models. If needed, the Models should be recalibrated. If first-phase facilities result in the system meeting applicable standards, the project should be considered complete. Should first-phase facilities prove incapable of achieving applicable standards, work on second-phase facilities should begin.

PLAN

Initial emphasis should be placed on identifying and eliminating those CSOs that can be readily abated. In this way the County can demonstrate its commitment, show progress and achieve actual water quality improvements, while detailed design and phasing issues of the larger CSO abatement and Metro improvement projects are resolved. These larger projects should be treated in the following manner:

1. Combined sewer overflows. In the first phase, regional treatment facilities for CSOs should be constructed, prioritized according to cost effectiveness. First phase facilities should involve both the elimination of overflow points and the construction of swirl concentrators at the remaining points. First phase facilities should be constructed without storage, but should be designed to permit retrofitting with storage facilities.

If needed in a second phase, additional facilities or technologies, which could include storage, should only be constructed if and when an analysis of the real-world operation of the first phase regional treatment facilities has demonstrated a need for additional remediation. If such need cannot be clearly demonstrated, the second stage should be held in abeyance.

The Hiawatha CSO swirl/storage demonstration project, which the Legislature has already approved, subject to availability of federal and/or state funding, may give an indication of whether storage, in addition to swirl concentrators, will have a positive, a negative or a neutral effect on discharges from the combined sewer system.

Implementation and operation of this facility could assist in determining whether or not the County should proceed with additional storage facilities.

2. Metropolitan Sewage Treatment Plant improvements. The first phase operations of the Metro plant should endeavor to maximize the plant's ability to meet site specific, reasonably achievable dissolved oxygen, ammonia and phosphorous standards. These improvements should include expanded flow capacity, seasonal ammonia removal, permanent chemical feed facilities for the current phosphorous removal technology and disinfection facilities. In this first phase, the Metro discharge point should remain where it is until the real-world effect of the Metro improvements on Onondaga Lake can be assessed. Thus decisions regarding deep water discharge or Seneca River discharge should not be made during phase one. At the same time, facilities should be developed in a way that does not preclude any option.

If necessary, a new discharge point should be chosen and developed as phase two.

FUNDING

1. There should be a concerted effort by local, state and federal officials to obtain state and federal aid in an amount equal to 75 per cent of the cost.

So that the public can be kept informed about the actual distribution of funding sources, County budget officials should be required to maintain a running account of local, state and federal expenditures on projects related to CSO abatement and Metro improvements (beginning with the projects set out in Appendix A of the Consent Decree and containing all subsequent projects).

2. Private sources of funding should be sought.

3. Once the Municipal Compliance Plan has been approved and costed out, there should be a thorough review and analysis of all available options for funding a local share.

4. Once the Municipal Compliance Plan has been approved and costed out, there should be a thorough review and analysis of the available options for managing waste treatment facilities. Continued operation by a County department and operation by a sewer authority should be among the options considered.

5. County financial officers should attempt to further limit the impact of the local share on local taxpayers by structuring the program so that revenues are state and

federal tax deductible. Officials should work with state and federal elected officials to make any changes in state and federal law needed to accomplish this.